Huntleigh
HEALTHCARE

Autoexcel™

Pressure Area Management System

Service Manual

Preface

Review this manual before attempting to service or repair the equipment.

This manual is intended to be used only by qualified Huntleigh Healthcare service technicians. In the event that the manual is provided to a customer in response to customer requirements, the customer is advised not to attempt repairs and to direct any required service to qualified Huntleigh Healthcare service technicians. In no event will Huntleigh Healthcare be responsible for any service performed by customers or third parties.

Warnings, Cautions and Notes

WARNINGS given in this manual identify possible hazards inprocedures or conditions which, if not correctly followed, could result in death, injury or other serious adverse reactions.

CAUTIONS given in this manual identify possible hazards in procedures or conditionswhich, if not correctly followed, could result in equipment damage or failure.

NOTES given in this manual are used to explain or amplify a procedure or condition.

General Warnings

WARNING

Before carrying out any service or maintenance procedures, ensure that the equipment has been adequately decontaminated.

Voltages in excess of 30 volts RMS or 50 volts DC can, in certain circumstances, be lethal. When working on equipment requiring exposure to live unprotected conductors where such voltages are present, extreme care must be exercised.

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1 INTRODUCTION

1.1 About This Manual

This manual contains information for servicing the **Autoexcel™** system which is comprisd of a pump and mattress. The manual is sectioned with tabbed dividers for ease of use and consists of the following sections.

Section 1 – **Introduction:** a general description of the overall operation of the system.

Section 2 – **Operational Maintenance:** describes both functional and static checks to ensure correct operation during the service life of the system.

Section 3 – **Troubleshooting:** contains tables of fault symptoms, possible causes and suggested steps to correct the problem.

Section 4 – **Preventive Maintenance:** contains a list of parts which should be replaced periodically to ensure the correct operation of the system.

Section 5 – **Using The Diagnostic System**: describes the initial set-up, testing and monitoring of the **Autoexcel** system using the Psion® hand-held computer.

Section 6 – **Servicing The Pump:** contains illustrated procedures for replacing pump components.

Section 7 – **Servicing The Mattress:** describes procedures for replacing mattress components.

Section 8 – **Technical Specification:** contains a list of technical data.

Section 9 – **Spare Parts:** contains a list of spare parts that should be kept in stock.

Appendix – **Parts List:** contains a list of currently available spare parts.

Psion® is a registered trademark of Psion PLC, London, England.

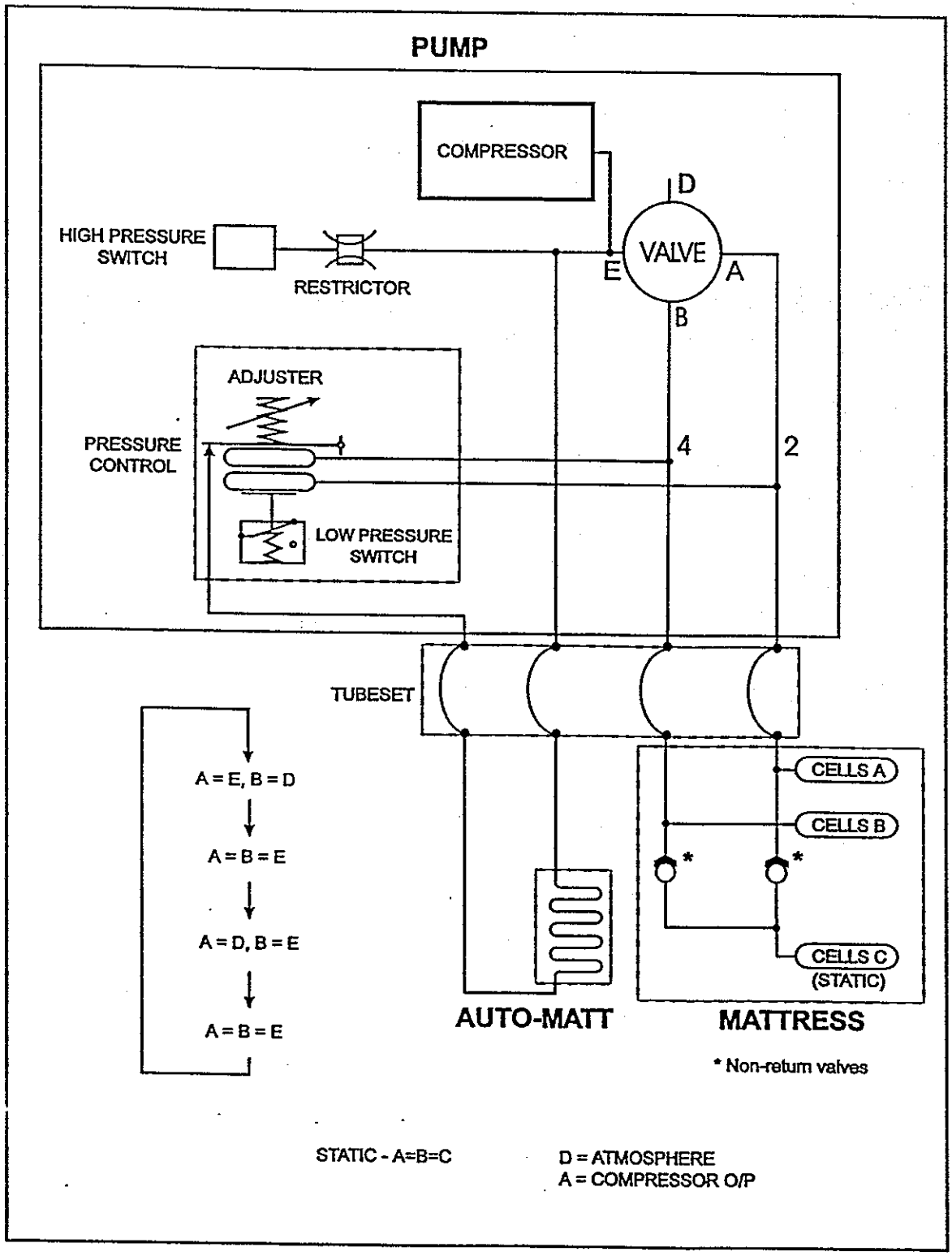


Fig.1.1 Pneumatic Diagram

1.2 Technical Description

The product is a powered, air-filled mattress overlay system. Control and alarm functions are software aided. The system includes an LED display.

The Huntleigh Healthcare **Autoexcel** System is a low air loss alternating power flotation device designed to be used for those patients who are at high risk of skin breakdown or with an existing pressure ulcer. It is designed to be placed on any standard bed and supply the necessary support to minimize the risk of skin breakdown caused by unrelieved pressure.

1.2.1 Operating Principle

The patient is supported by 18 air cells which are enclosed in a polyurethane coated nylon cover. This two-way stretch cover is waterproof and vapor permeable.

The system incorporates a sensor pad that automatically adjusts the support pressure within the system to accommodate different weight patients and their weight density or distribution. This sensor, known as the **Auto-Matt®**, optimizes the pressure to which the air cells are inflated to support the patient in any position.

The cell construction features low air loss through micro-perforations to prevent heat build-up and maceration.

1.2.2 Operating Mode

In operating mode the support surface beneath the patient is cycled every 10 minutes to provide periods of pressure relief for the body surface.

Figures 1.1 and 1.2, show how the system operates the cycle. Figure 1.1 shows the pneumatic circuit in principle. A compressor system provides the source of air supply, which is fed to a high pressure switch, the **Auto-Matt** and a rotary valve. The high pressure switch is used to detect system over-pressures through blockages. The rotary valve channels the air supply as shown:

- to outlet A with B at atmosphere (D)
- to outlet A and B
- to outlet B with A at atmosphere
- to outlet A and B

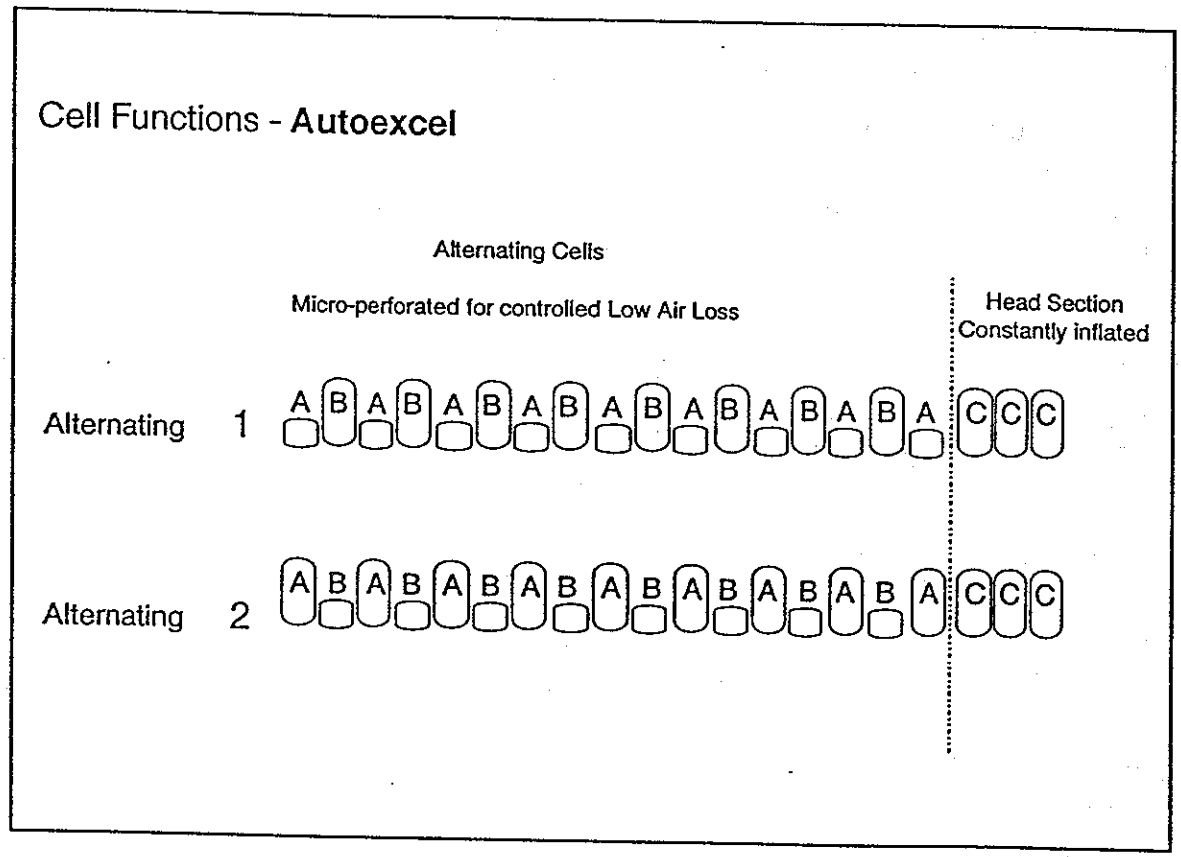

Cell Functions - Autoexcel
Alternating Cells
Micro-perforated for controlled Low Air Loss
Head Section
Constantly inflated
Alternating 1
A B A B A B A B A B A B A B A B A C C C
Alternating 2
A B A B A B A B A B A B A B A B A C C C

Fig. 1.2 Mattress Cells (Side View)

This allows cells A and B in the mattress to be cyclically inflated and deflated over a period of ten minutes.

The **Auto-Matt** is situated under the cells and acts as a pressure regulator. It is pneumatically connected in parallel to the mattress cells and when it is not occluded, channels air supply away from the cells. Normal occlusion of the **Auto-Matt** is by patient position and weight. This allows internal mattress air pressure to be optimized to that required to support the patient.

In the mattress there is a third section of cells labelled as C. These are fed through partial one-way valves from cells A and B and are, therefore, never at zero pressure. These are positioned at the head end of the mattress to prevent movement of the patient's head.

1.2.3 Auto-Matt

The **Auto-Matt** consists of a flexible air line underneath the mattress cells, and compensates for patient weight and position in the following manner:

With no patient on the mattress, the **Auto-Matt** is not occluded and pressure in the mattress is governed by the pressure control shown in Figure 1.1.

With a patient on the mattress, air pressure is exerted onto the cells and this can partially or totally occlude the **Auto-Matt**. This results in more air being supplied to the cells increasing their internal pressure until full patient support is achieved. If the patient changes to a position which necessitates a lower mattress pressure, air is released via the **Auto-Matt** through the pressure control valve until the correct lower pressure is achieved in the cells.

1.3 Alarm System

This section helps to clarify the way in which the alarms are activated in Autoexcel. Please read this carefully; the alarm systems are necessarily complicated in order to differentiate between genuine fault conditions and signals caused by patient movement, etc.

1.3.1 Indicators

The Autoexcel incorporates indicators for Alarm, Mute and Wait.

1.3.1.1 *Low Pressure*

The **Alarm** message will be illuminated whenever a low pressure is detected.

In a normal and fully functioning system, this panel could be expected to illuminate when:

- for 2-3 seconds when the system has just been switched on. (**Wait** will remain illuminated while the mattress is inflating).
- when the alarm is activated as described in 1.3.2.1.

1.3.1.2 *High Pressure*

The **Alarm** message will be illuminated whenever a high pressure is detected.

In normal and fully functioning system the alarm could be expected to illuminate whenever a high pressure routine is activated as described in 1.3.2.2.

1.3.2 Pressure Alarms

Pressure alarms are generally the result of the above conditions being persistent (i.e., repetitive or continuous) as the pump assumes they are caused by a system fault. Once an alarm has been initiated, it can only be cancelled by turning the pump off (for approximately 5 seconds) and on again. The cause of the last

alarm is recorded in the PCB memory and can be accessed using the Psion® Organiser diagnostic tool, giving the user the opportunity to take informed corrective action.

1.3.2.1 *Low Pressure Alarms*

The conditions that cause a low pressure alarm to initiate are described below. Generally, the system is trying to differentiate between patient movement, nursing procedures and a genuine fault condition.

a) *Failure to Inflate Mattress.* When the unit is first switched on and a low pressure is detected, it assumes the mattress is deflated. During this inflation period, low pressure signals will not cause an alarm unless they persist for 25 minutes. The 25 minutes is to allow inflation of a fully deflated and cold system and minimize false alarms during this period.

   This mode of ignoring the low pressure ceases 1 minute after the low pressure signal has stopped, i.e., the system is at an operating pressure.

b) *Intermittent Low Pressure Alarm.* Low pressure (LP) signals can be readily caused by patient movement and nursing procedures. This has resulted in the development of a sophisticated alarm initiation procedure that is tied into the cycle times of the system.

   The alarm system operates as follows:

   After the first low pressure signal, further low pressure signals are ignored for 2 minutes. (This allows time for the system to recover from the patient being moved or removed from the mattress).

   If a second LP signal occurs between 2 and 25 minutes of the first, further LP signals are ignored for 2 minutes as before.

   If a third signal occurs between 2 and 25 minutes of the second, the alarm is initiated.

   In summary, to initiate an alarm, three low pressure signals are required, each spaced by at least 2 minutes and no more than 25 minutes. Patient movement is filtered out, and the alarm system only responds to low pressure signals that are periodic and tied into the cycling of the system. Causes of this would be a leak in one side of the pneumatics, e.g., a damaged cell that results in low pressures in one half of the cycle only.

c) *Constant Low Pressure Alarm.* A constant low pressure is detected in the same way as intermittent low pressures.

After the first detection of low pressure, the signal is ignored for two minutes. The second detection becomes valid. Two minutes later, the third detection is valid and the alarm initiated. Therefore, the alarm will become active approximately 4 minutes after low pressure was first detected.

1.3.2.2 *High Pressure Alarms*

The conditions that cause a high pressure (HP) alarm to initiate are described below. Once again, the system is trying to differentiate between patient movement, nursing procedures and a genuine fault condition.

Whenever high pressure is detected, the 'high pressure' panel illuminates and the compressor is turned off. The pressures detected will then naturally reduce below the HP trigger level. Approximately 2 seconds after the HP signal has stopped, the compressor is switched back on. In this way the mattress cannot be pressurized above the high pressure switch set point.

a) *Intermittent High Pressure.* Momentary high pressures can be caused in routine usage (e.g., the tubeset being temporarily blocked). These should not create an alarm. In order for an alarm to be initiated, the following sequence has to happen:

After the first high pressure signal, the alarm system ignores further HP signals for 2 minutes.

If a second high pressure trip occurs between 4½ and 10½ minutes after the first, a high pressure alarm is initiated.

In summary, to initiate an alarm, two high pressure signals are required spaced by at least 4½ minutes, and no more than 10½ minutes.

b) *Constant High Pressure.* Constant high pressure (or the cause of it) is detected in the same way as intermittent high pressures. Because the compressor is switched off whenever HP is detected, this detection will always be intermittent.

After high pressure is first detected, the alarm system ignores further high pressures for 4½ minutes. If it is still there after that time, the alarm is initiated.

1.3.3 System Fault Alarms

System fault alarms indicate that there is a fault with the pump as outlined below.

1.3.3.1 *Rotary Valve*

If the rotary valve is not rotating, or there is more than 5.5 minutes between half cycles, the alarm is initiated.

1.3.3.2 *Pressure Detection*

If conflicting signals are detected by the microprocessor, e.g. high and low pressures at the same time, an alarm is initiated.

1.3.4 Power Fail Alarm

A power fail alarm occurs whenever power is removed from the unit with the on/off switch in the on position. When power is recovered, the pump unit will:

a) continue as if nothing had happened

b) continue as before but with the word **POWER** steadily illuminated.

Please note that to allow for 'brown outs', there is a period in which the pump units will not respond when power is first removed.

1.4 Servicing Protocol

1.4.1 General Service - Pump

Initial Assessment (Visual)
Check:

a) Enclosure condition

b) Fittings for damage and security

c) Labeling is secure and legible

Open Pump and check:

d) Wiring security and terminations are secure

e) Tubing security and integrity

f) Components fastenings are secure

g) General condition inside is clean

h) Silencer bag weld seams

Open Compressor and check:

i) Shuttle valve assembly condition

General:

j) Check power cord assembly for security

k) Clean condition of pump

If any items in a) - i) appear defective, replace with appropriate spare part and record action on service record sheet.

Re-assemble pump unit completely, run for a minimum for 1 hour and check calibration. Adjust if required.

1.4.2 Mattress Service Protocol Following Laundering/Cleaning

Layout mattress and check:

a) General condition of mattress

b) All components are secure and intact

c) Tube set is in good condition

Inflate System and check:

d) Weld integrity (i.e., no leaks)

e) All fittings (i.e., aprons, base sheets, connectors) are secure, are of good quality and in good condition

f) Printing of instructions is legible

g) Cover sheet assembly is in good condition

h) Serial number is secure and legible

If any item a) - h) appears defective then, where possible, replace with the appropriate spare part and record action on the service record sheet.

1.4.3 Testing

The following procedures should be carried out following any repair and as part of the routine service.

Perform electrical safety checks, functional tests and calibration checks as instructed in Section 3.

Note: It is important to ensure all tools which are used for servicing are kept in good condition and test rigs for measuring flow and pressure are regularly calibrated to a reference gauge with calibration directly traceable to appropriate National Standards.

This section provides operational maintenance and fault finding procedures which should be used to ensure the equipment remains in a functional state. If spare parts are required, please refer to the spare parts list and quote the item, part number and quantity.

2.1 Routine Checks

These procedures should be carried out each time the pump unit is installed.

Item	*Maintenance Procedure*
Pump unit	
General	Inspect pump unit for external damage to case, controls, connections etc. Inspect power cord for damage, twisting. Replace damaged items. Test all controls.
Mattress	
Mattress cells	Pressurize mattress support cells and check for sagging of individual cells. If necessary, replace faulty cells.
Loop sheet	Part the cells and inspect for damage to the welds between the loops and base sheet. If damage is found, replace the loop sheet assembly.
Auto-Matt	Check for correct position and inspect for damage or kinking. Adjust or replace if necessary.
Tube set	
Hoses	Inspect hoses, connectors and latches for damage, replace complete hose if necessary.

3.1 General

Preventive maintenance should be carried out every 12 months.

Replace the following components:

- All seals including:
  - gaskets
  - 'O' rings
  - manifold
  - case seals
  - tube-sets, 5-way
- Bellows/shuttle assembly
- AV mounts
- Filters (four in the compressor, one in the pump case handle)

The compressor and pump unit should be tested as given below and results recorded. Test sheets are to be retained in Service History records.

All test results should be within the limits recommended by Huntleigh Healthcare and specified on the service record.

After service,log the hours at this service and reset the service counter with the Psion computer. (Refer to Section 5 for use of the Psion).

3.2 Testing

After carrying out any repair work or servicing the equipment, the following tests should be undertaken.

The purpose of this procedure is to ensure that all **Autoexcel** pumps have been adequately tested and comply with all relevant specifications and quality standards.

All test gauges used should be regularly calibrated.

3.2.1 Electrical Safety Checks

3.2.1.1 *Ground continuity test*

Check the integrity of the bond between the ground pin on the cord plug and grounded dead metal parts on the pump.

The bond resistance should be not more than 0.2 ohms.

3.2.1.2 *Leakage current test*

Measure the risk currents in accordance with the AAMI American National Standard "Safe Current Limits for Electromedical Apparatus", or as specified in UL544.

Functional Tests and Calibration Checks

To test and calibrate the pump unit correctly, the following equipment is required:

a) Part No. PRE060 dual pressure gauge (0-160 mmHg) and flow meter (0-25 liter/minute).

b) Part No. 151126 5-way tube set adapter.

c) Part No. MIS136 Psion Organiser with
Part No. MIS138 Service module.

Tests must be carried out usingg a 120 V ± 10% 60 Hz power supply with ground connection.

3.3 Test Set-up

1. Connect the power cord to a suitable power outlet and turn on the On/Off switch on the pump. The pump front panel should illuminate all LED's for a few seconds, then display **ON** and **WAIT.**
2. Using the 5-way tube set adapter, connect the pump to the pressure gauge/flow meter test rig. The **Auto-Matt** ports (1&5) should be linked together and one of the pump outlet ports (2 or 4) connected to the rig. Close the valve on the test rig.

   The second pump outlet (2 or 4) will be automatically closed by the self-sealing coupling on the tube set adapter.

3.4 Power Fail Alarm Option Check

1. With the pump unit switch in the **ON** position, disconnect the power supply at the wall outlet. The pump should respond in less than 10 seconds, by illuminating the flashing red LED while sounding the audible alarm.
2. Push the **MUTE** button. The audible alarm will be silenced, but the LED will continue to flash.
3. Reset the power fail alarm by turning the pump On/Off switch to **OFF** (for approximately 5 seconds) and back to **ON.** The LED will go out. Reconnect the power supply.

The pump will respond in two ways (excluding the **ON** and **WAIT** indicators which are active):

Power Fail Option On. No audible alarm, but **POWER** indicator displayed.

Power Fail Option Off (U.K. only). No audible alarm, and nothing displayed on the Pump.

Check that the option is correctly set.

3.5 Pressure Switch Checks

3.5.1 High Pressure Switch Setpoint Check

1. Establish communication between the pump unit and the Psion Organiser (refer to Section 5).

   It is convenient to mount the Psion on a block or a simple stand to maintain communication while leaving the hands free.

2. Enter the INPUTS menu and monitor operation of the high pressure switch. The condition of the switch will be indicated on the Psion display.
3. Ensure that the duty port is being monitored. Carefully occlude the **Auto-Matt** tube loop. The pressure will increase until the high pressure switch operates (ON is indicated on the Psion display) and the compressor stops.
4. Record the pressure when this occurs, which should be 75 mmHg (±5 mmHg).

3.5.2 Low Pressure Switch Operation Check

1. Following prompts on the display, set the Psion to monitor the low pressure switch. The condition of the switch will be indicated on the Psion display.
2. Disconnect the tubeset adapter from the pump unit. The low pressure switch should close (ON). Reconnect the tubeset adapter. The low pressure switch should open (OFF).

3.6 Calibration Check

1. Ensure that the duty port is being monitored.
2. Verify that, with the test rig valve closed, the indicated pressure is between 22 and 26 mmHg.
3. Fully open the valve on the test rig. The free air flow must be greater than 9 liters per minute.
4. Repeat this check on the other outlet port. The difference in free air flow must not be greater than 3 liters per minute between the ports.

3.7 Reset Alarms

On completion of the above checks, use the Psion Organiser to reset all registered alarms on the pump unit.

3.8 Check Pump Serial Number

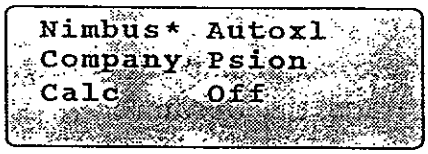
Select `Serial` menu item on the Psion. Cross reference serial number displayed with serial number on pump case. Record numbers in Service History.

Fault	*Possible Cause*		*Remedy*
HP Alarm.	Mattress	Sensor Pad kinked.	Correct.
		Sensor Feed/Return tube kinked.	Correct.
	Tubeset	Tube set kinked or blocked.	Clear blockage or replace.
	Pump	Faulty HP switch.	Replace.
LP Alarm	Tubeset	Incorrectly connected.	Check fitting.
		Damaged.	Replace.
	Mattress & Pump	5-way gasket damaged.	Replace.
		Foreign body between tube connector and 5-way gasket.	Clean and retest.
	Mattress	Cell leak.	Replace.
		Leak in non-return valves.	Replace.
		Weld fault in mattress manifold.	Trace and replace.
	Pump	Faulty compressor.	Check bellows. Replace if necessary.
		Blocked air filters.	Check and replace.
		Main compressor valve flaps.	Check and replace.
		Leaking tube.	Inspect hose loom. Replace damaged hose(s) or poor joint.
		Faulty switch.	Check switch point and replace Pressure Control assembly.
No Power Fail Alarm	Pump	Battery discharged.	Leave unit on for 24 hours to recharge.
		Battery failure.	Replace Control Board.
Power Fail Alarm With Unit Off	Pump	Faulty Power Switch.	Check and replace.
		Poor connection between Power and Control Boards.	Check and repair.

Pump Fault Alarm	Pump	Rotor microswitch incorrectly set or faulty.	Check setting and reset, or replace if necessary.
		Rotor not rotating.	Check synchronous motor and replace if necessary.

5.1 Turning On and Off

The Psion 'Organiser II' is turned on by pressing the ON key, and turned off by selecting `Off` from the main menu or pressing the **O** key. If the infrared interface is already plugged into the top socket of the Psion 'Organiser II', the following special Huntleigh Healthcare menu should be displayed:



* Depending on the issue of Psion, the display will show either **Nimbus** or **DFS2.**

When the interface is first plugged into the top socket, the Psion's own menu is displayed. Pressing the **ON** key a second time will exchange this for the Huntleigh Healthcare menu.

To save battery power, if the Psion is left on for a while without any key presses by the user, it will automatically switch off and the display will go blank. Pressing ***ON*** will restore the display – it will pick up where it left off.

5.2 Selecting Menu Items

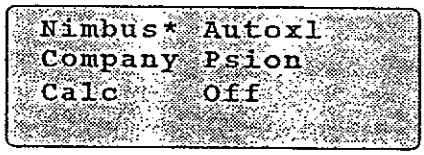
The program uses several menus. To select the item you want, either

a) use the arrow keys to move the cursor (the flashing dark block) to the wanted item, then press the EXE key, or:

b) press the letter key corresponding to the first letter of the wanted item (for instance, `A` for **Autoexcel**). If there is more than one item beginning with the same letter, the cursor will simply advance to the next item beginning with that letter, and you will have to use method a).

The menu will then be replaced by the display for the selected item. When you have finished, you will return to the menu that you started from.

5.3 The Huntleigh Healthcare Menu



Nimbus II Service functions for the **Nimbus II** pump unit.

* Note that in later versions, `DFS2` will be shown in place of `Nimbus`.

Autoxl Similar functions for the **Autoexcel** pump unit. These are the functions described in the rest of this document.

Company Huntleigh Healthcare company information, address and telephone number.

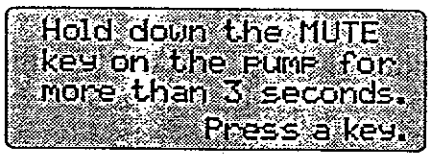
Psion Leads to the normal Psion 'Organiser II' menu, except for the following two sections.

Calc The Psion calculator function.

Off Switches the Psion 'Organiser II' off.

5.4 Starting Communications with the Autoexcel

Point the interface end (top) of the Psion at the small window in the front panel of the **Autoexcel** pump, through which the infrared emitter and detector can dimly be seen.



Select `Autoexcel` from the main menu. The Psion responds with:

Press the **Mute** key for three seconds – this tells the **Autoexcel** that you want to communicate with it. The **Autoexcel** is now in 'serial communications mode'. It will go back to normal if you give it the command to quit (see below) or after 1 minute with no communications. In normal operation it will not respond to messages from the Psion.

Then press a key, as instructed, on the Psion. First, any alarms which have been registered since the alarm counts were last zeroed will be read back from the **Autoexcel** and displayed, as in section 5.7. Then the **Autoexcel** menu will be displayed.

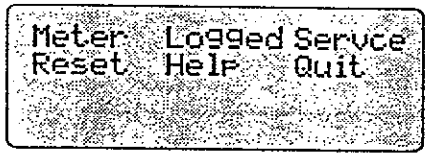
5.5 The Autoexcel Menu

The bottom two lines of this menu are not displayed immediately, but may be scrolled up by using the arrow keys. These selections (except `Quit`, `Sound` and `Leds`) are described later in this section.

Item	Function
Sound	Beeps the **Autoexcel**'s sounder to test whether it is working. This will not sound quite like a normal bleep because the on-chip timer normally used for the sound is being used to provide the baud rate for serial communications.
Hours	Allows logged hours to be read and the meter to be zeroed.
Alarms	Displays alarm counts and allows them to be zeroed.
Inputs	Reads the low pressure switch, high pressure switch, valve microswitch and mute mode switch, and indicates whether they are on or off.
Serial	Allows the pump serial number to be read.
Leds	Lights all the **Autoexcel**'s LEDs for 3 seconds.
Pump	Indicates which compressor coils are turned on, and allows them to be switched on and off individually.
Cause	Indicates cause of last alarm registered.
Quit	Returns to the Huntleigh Healthcare menu.

5.6 Logged Hours Functions

Selecting Hours on the **Autoexcel** menu will display a menu of logged hours functions, as follows:



Meter Displays the hours count on the **Autoexcel**'s 'meter reading' counter. This counts up 1 for every hour of service time, and can be reset via the Psion. The Psion then asks the user whether to reset to zero. If `Y` is selected, and a password given (see section 5.13) zero is written to the meter location in the **Autoexcel**'s memory.

Logged Displays the logged hours of operation since the **Autoexcel** board was manufactured. This cannot be reset.

Service Displays the logged hours at last service.

Reset Starts a new preventative maintenance cycle by setting the 'hours at last service' count in the **Autoexcel** equal to the present logged hours since manufacture. This, like the meter reset, requires a password.

5.7 Reading And Zeroing Alarm Counts

The `Alarms` selection on the **Autoexcel** menu causes the Psion to read the stored alarm counts from the **Autoexcel**'s non-volatile memory. These are first displayed by category, for high pressure, low pressure, system fail and power fail. After a key is pressed, the low pressure alarms are displayed.

You are then invited to zero the alarms. If `Y` is entered and a password given, zeroes are written to all the alarm count locations in the **Autoexcel**. If `N` is entered, you are returned to the **Autoexcel** menu.

5.8 Reading the Pump Serial Number

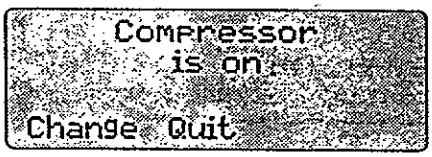
Selecting `Serial` from the **Autoexcel** menu causes the Psion to read the serial numbers from the **Autoexcel**'s memory, producing this display:

Pressing a key will take you back to the **Autoexcel** menu.

5.9 Controlling the Compressor Coils Directly

The Pump selection on the **Autoexcel** menu allows you to switch the compressor on and off. This may be useful for fault-finding.

On selecting `Pump`, the following display is produced:



The '`on`' and '`off`' shows the coils of the compressor are operating.

The bottom line if the display is a menu.

To change between 'on' and 'off' for the compressor, select `Change`. When you have selected `Change`, press the **EXE** key.

At this point, the Psion will send a message to the **Autoexcel** pump to change the on/off state of the compressor, then it will read the compressor state back and display it. You should see the displayed state change from 'on' to 'off' or from 'off' to 'on'. The cursor will return to the menu line.

> The Psion displays the on/off state of the microprocessor's outputs. If the compressor is displayed as '`on`' *but is clearly not working, there may be a wiring fault in the coil circuit.*

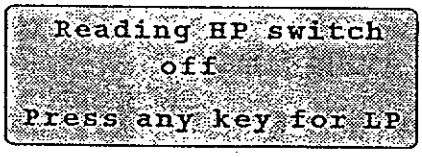
To go back to the **Autoexcel** menu, select `Quit` from the bottom line menu.

5.10 Reading the Autoexcel Inputs

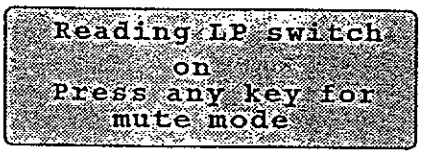
Selecting `Inputs` from the **Autoexcel** menu allows you to check whether the **Autoexcel**'s four internal input switches are on or off. This may be useful for troubleshooting.

Selecting `Inputs` causes the Psion to read data from the **Autoexcel** and produces the following displays on the Psion:

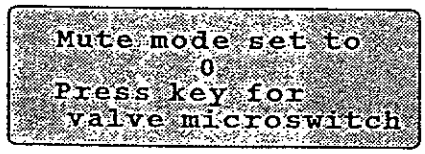
Initially:



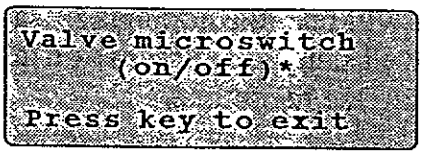
After a key press:



After a further key press:



After a further key press:



* depends on actual state.

In each case the Psion reads the input state from the **Autoexcel** and displays it on the second line as `On/Off`, `Open/Closed` or `1/0`.

The display is refreshed approximately every 1 second, so that you can change the inputs (e.g., by increasing pressure to get an HP trip) and this will be reflected on the Psion.

The HP and LP trips are shown '`On`' if the conditions are logically true, (HP and LP respectively) and '`Off`' if the conditions are not true (not HP and not LP).

The Mute mode setting corresponds to the marking on the PCB slide switch.

Note. If the Autoexcel is in mute mode 1, the audible alarm can be silenced in advance by pressing the mute button on the pump. In mute mode 0 (which is normal), it can only be silenced after an alarm has occurred.

5.11 Entering a Password.

Certain functions which change the **Autoexcel** pump's non-volatile data are password protected. In order to access them, you will have to enter a password. The Psion will simply prompt, and you will key in the password. This will produce a string of X's on the display, to prevent anyone from reading the password over your shoulder. When you press EXE, either the password will be accepted, in which case you will be able to proceed with the function, or an error message will be generated.

5.12 Communication Errors

If the Psion produces a message such as `BAD TRANSMIT`, `BAD RECEIVE`, `BAD CHECKSUM` or `TIMED OUT` it means that a message or its reply has failed. This may be due to:

a) too little infrared getting through, due to poor alignment with the **Autoexcel**'s communication window, or

b) the **Autoexcel** having timed out after 1 minute with no communications.

Note: The infrared link is not as long-range as TV remote controls. This is because more complex signals are being sent and received, and because the infrared emitter has to share battery power with the Psion's computer circuitry.

WARNING

The pump unit must be disconnected from the electric power supply before any maintenance or servicing work is carried out.

Caution

This unit contains parts that can be damaged by electrostatic discharge. Appropriate grounding precautions must be taken during dismantling and assembly.

The following pages contain illustrated spare parts and servicing instructions as listed :

1. Removal of the rear case assembly
2. Pump filter replacement
3. Rotary valve assembly replacement
4. AV mount replacement and compressor fitting
5. Compressor filter and bump stop replacement
6. Bellows replacement
7. Display panel PCB replacement
8. High pressure switch replacement
9. Pressure control sub-assembly and power switch replacement
10. Connector gasket replacement

Part numbers are given for reference purposes. to order replacement parts or spares, refer also to the Spare Parts List, Appendix A.

After carrying out any repair work or servicing the equipment, the pump should be tested as given in Section 3.

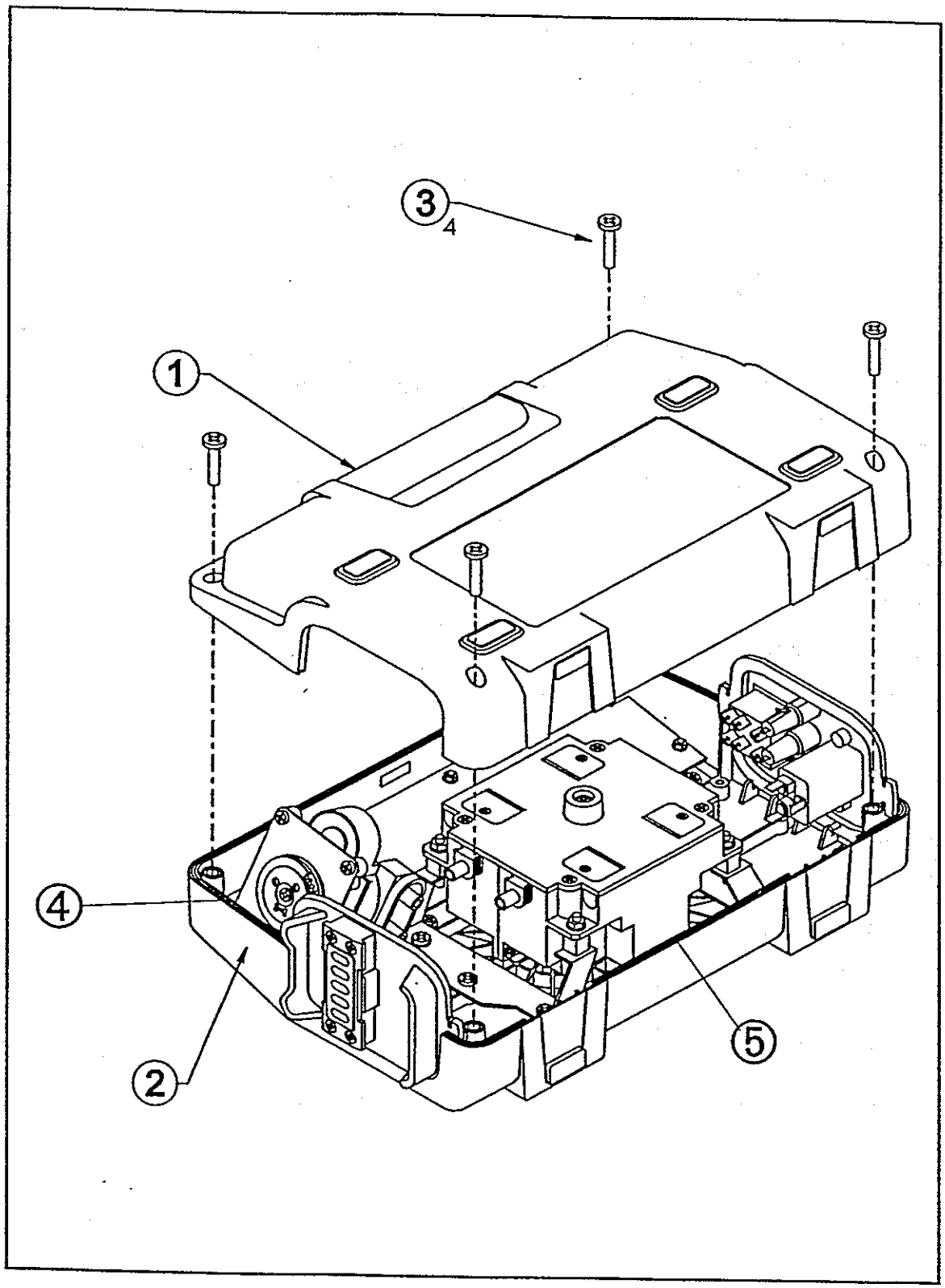


Fig. 6.1 Removing the Rear Case Assembly

3.1 Removing the Rear Case Assembly

Item	*Part Number*	*Description*	*Qty*
1	198053	Rear case assembly	1
2	198094	Front case assembly	1
3	FAS 071	Pan head screws	4
4	SIL-16	2.0mm sponge cord	445mm
5	SIL-16	2.0mm sponge cord	335mm

It is necessary to remove the rear case from the front case to allow access to all pump components.

WARNING

Before dismantling the pump unit, ensure the unit has been isolated from the power supply by removing the plug from the wall outlet.

It is necessary to remove the rear case from the front case to allow access to all pump components.

To remove the rear case :

1. Place the pump unit on a flat surface with the front case (2) face down.
2. Unscrew the four pan head screws (3) and lift the rear case (1) from the front case (2). Keep screws (3) in a safe place.
3. Inspect the neoprene sponge cord (4&5) for damage. Replace if necessary.

The pump unit is now ready for internal inspection/servicing.

Replacement of the rear case (1) is in the reverse order of removal.

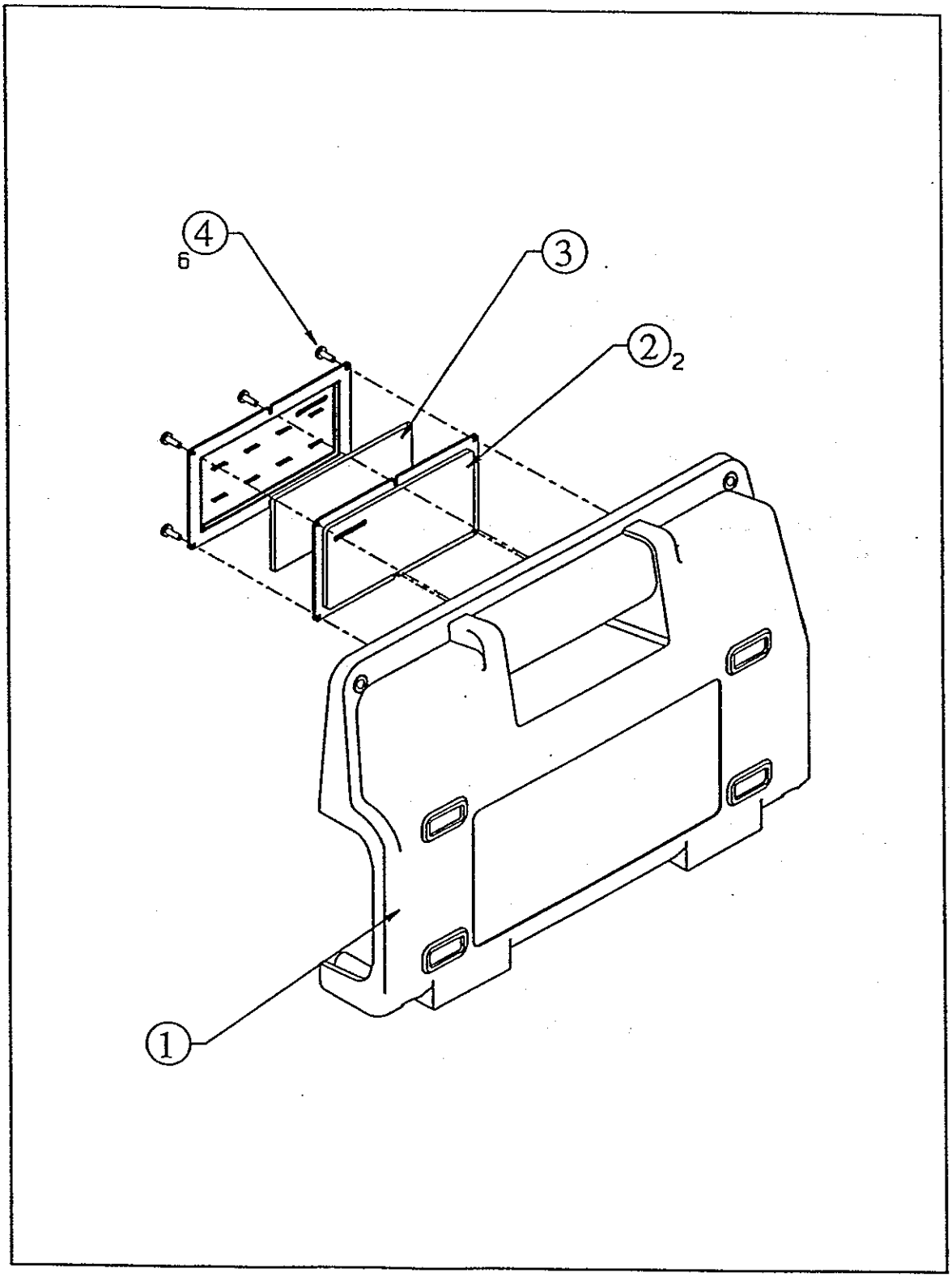


Fig. 6.2 Replacing the Pump Filter

6.2 Replacing the Pump Filter

Item	*Part Number*	*Description*	*Qty*
0	198053	Rear case assembly	Ref.
1	198301	Case rear	1
2	151311	Filter housing	2
3	151312	Filter	1
4	FAS 179	ø2.5 x 10 pan head self tapper	6

1. Remove the pump rear case (1) and lay it on a flat surface.
2. Remove the six screws (4) and carefully set aside.
3. Remove the filter housing (2) and filter (3).
4. Discard old filter and replace.
5. Refit filter in the reverse order of removal.

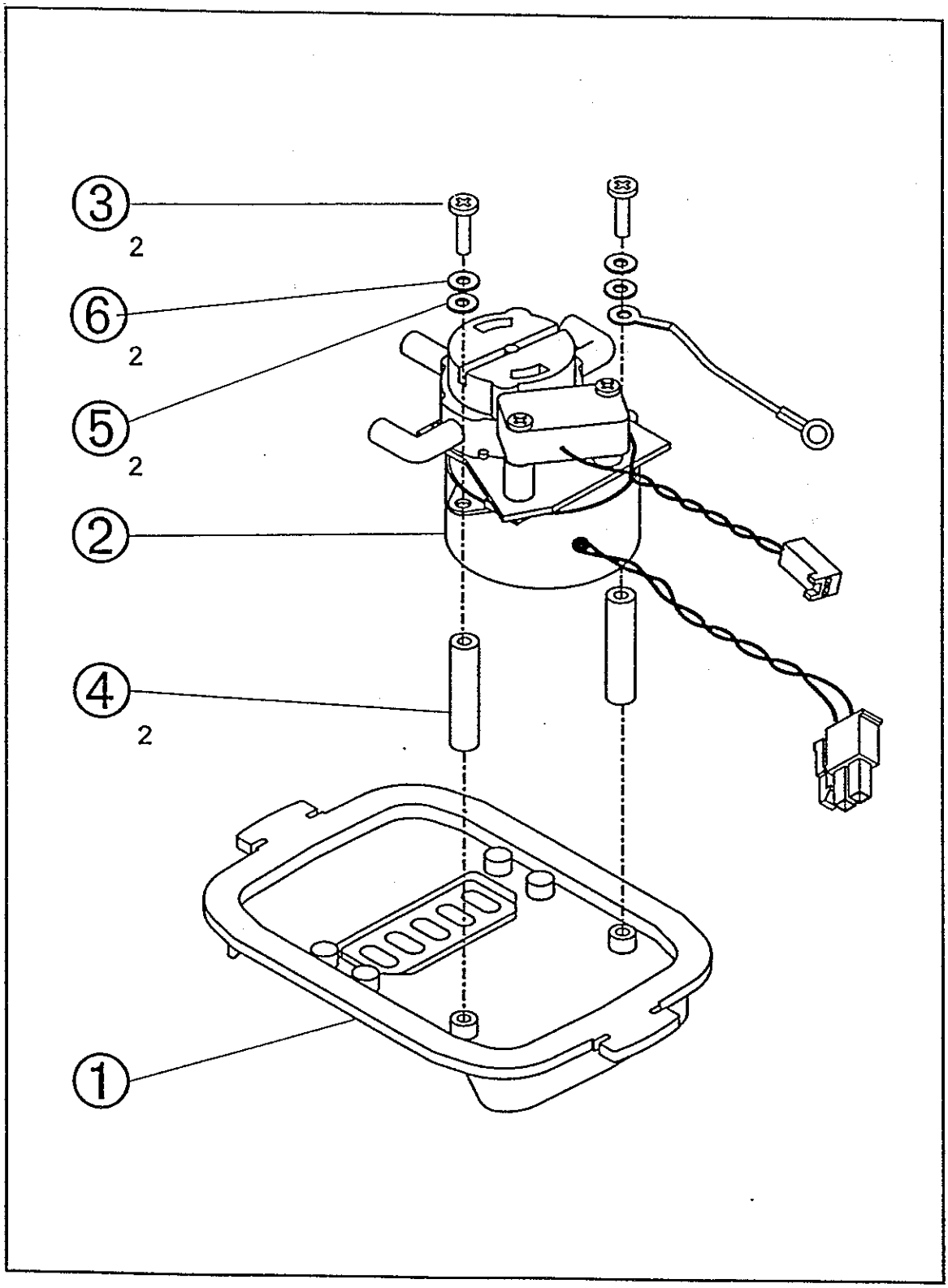


Fig. 6.3 Replacing the Rotary Valve Assembly

6.3 Replacing the Rotary Valve Assembly

Item	*Part Number*	*Description*	*Qty*
0	198056	Assembly, pneumatic side panel	Ref.
1	198302-1	Pneumatic side panel	1
2	198085	Rotary valve sub-assembly	1
3	FAS 048	M3 x 6 pan head screws	2
4	151352	Pillars M3 x 27mm long	2
5	FAS 002	M3 washer	2
6		M3 washer (shakeproof)	2

1. Remove the rear case assembly (as described in 6.1) and identify the rotary valve sub-assembly (2) on the pneumatic side panel assembly.
2. Remove and discard the 'T' tubes from the rotary valve assembly. Disconnect the electrical connectors (con 3 and con 5/cycle) at the PCB.
3. Remove pneumatic side panel from rear case assembly. (The assembly will still be attached to the pump assembly by the ground wire.)
4. Unscrew the two screws (3) and remove the screws (3), washers (5), shakeproof washers (6) and pillars (4). Remove the rotary valve sub-assembly (2).
5. Replace components in the reverse order of removal, using new 'T' tubes. (Make sure you reconnect the ground wire.) Bond the 'T' tube to the top port on the pressure control assembly using cyanoacrylate adhesive (quick drying super glue).

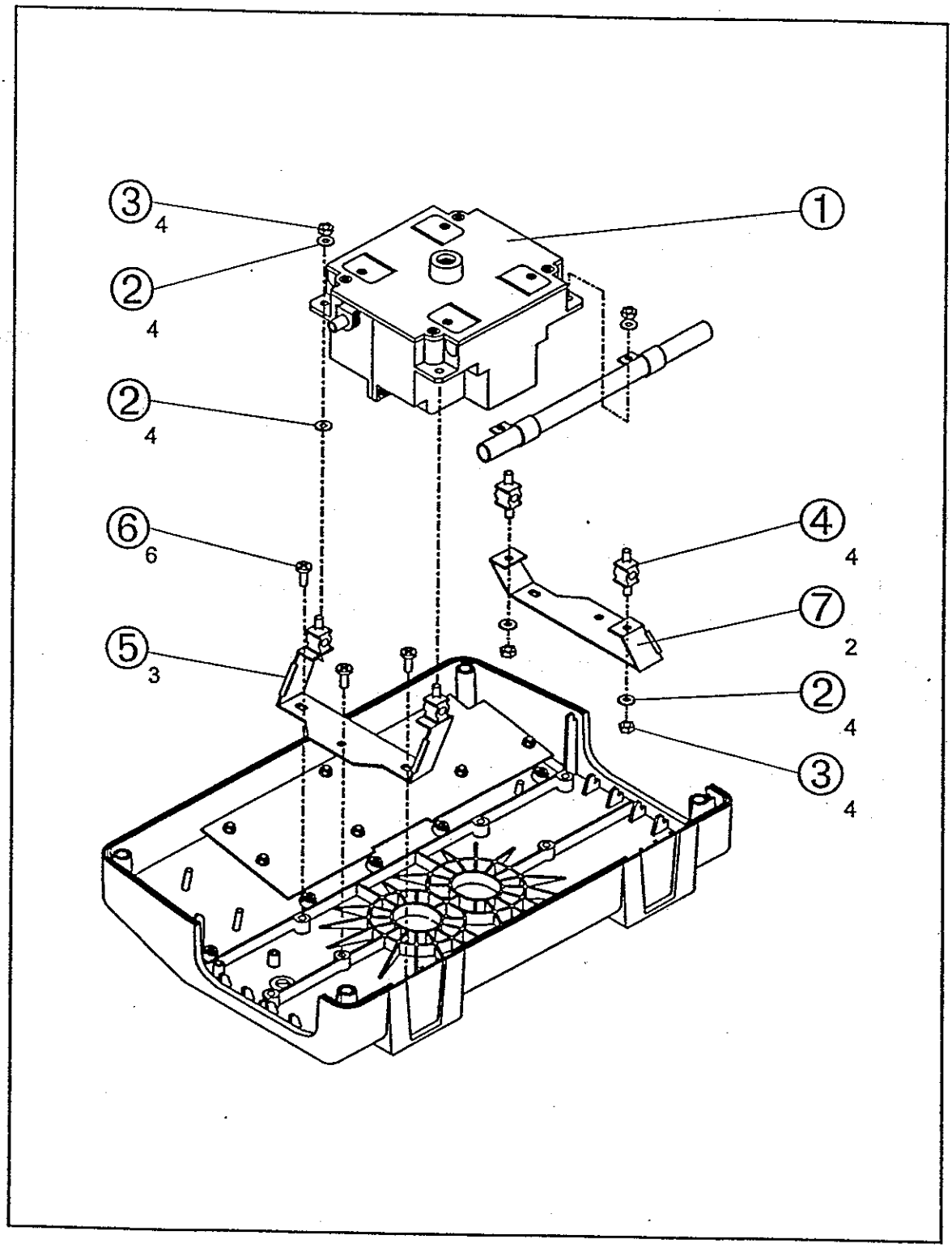


Fig. 6.4 Removing AV Mounts and the Compressor Assembly

6.4 Removing AV Mounts and the Compressor Assembly

Item	*Part Number*	*Description*	*Qty*
1	165003	Compressor assembly	1
2	FAS 053	M4 washer (shakeproof)	10
3	FAS 178	AV mount nuts	8
4	M2G05-00380	AV mounts	4
5	RS-703	Neoprene beading (3x33mm)	3
6		Ø4x8mm Pozidrive screw self tap	6
7	151310	Mounting bracket	2

Replacement of compressor components (bellows, etc.) should not be attempted with the compressors in place. If the compressor unit fails the compressor assembly must be removed to allow maintenance/repair. The compressor assembly is secured to the AV mounts by the top AV mount nuts (3).

1. Remove pump rear case assembly (as described in 6.1).
2. Release top AV mount nuts (3) and shakeproof washers (2). Remove tubes from compressor outlets and disconnect the electrical wires from the PCB.
3. Remove the 'P' clips from the AV mount studs and lift the compressor assembly clear of pump case. Remove four shakeproof washers (3) from the AV mounts.
4. Inspect AV mounts (4) which are secured by the lower AV mounting nuts (3) and shakeproof washers (2). Replace AV mounts if damaged, ensuring that they are correctly orientated (holes facing top and bottom of pump) and mounted square.
5. Remove six self tapping screws (6) and the mounting brackets (7).
6. Replace in the reverse order of removal.
7. Torque self tapping screws (6) to 60cNm. Attach neoprene beading (5) using IS495 cyanoacrylate adhesive (quick drying super glue).
8. Ensure all ground wire assemblies are connected to the ground stud on the compressor mounting bracket (7). First secure the internal ground wire with a shakeproof washer and nut, then fit the remaining ground wires with a second shakeproof washer and nut. Tighten the nut so the eyelets fan out away from the compressor assembly.
9. Secure the tube on top right compressor outlet with a cable tie.

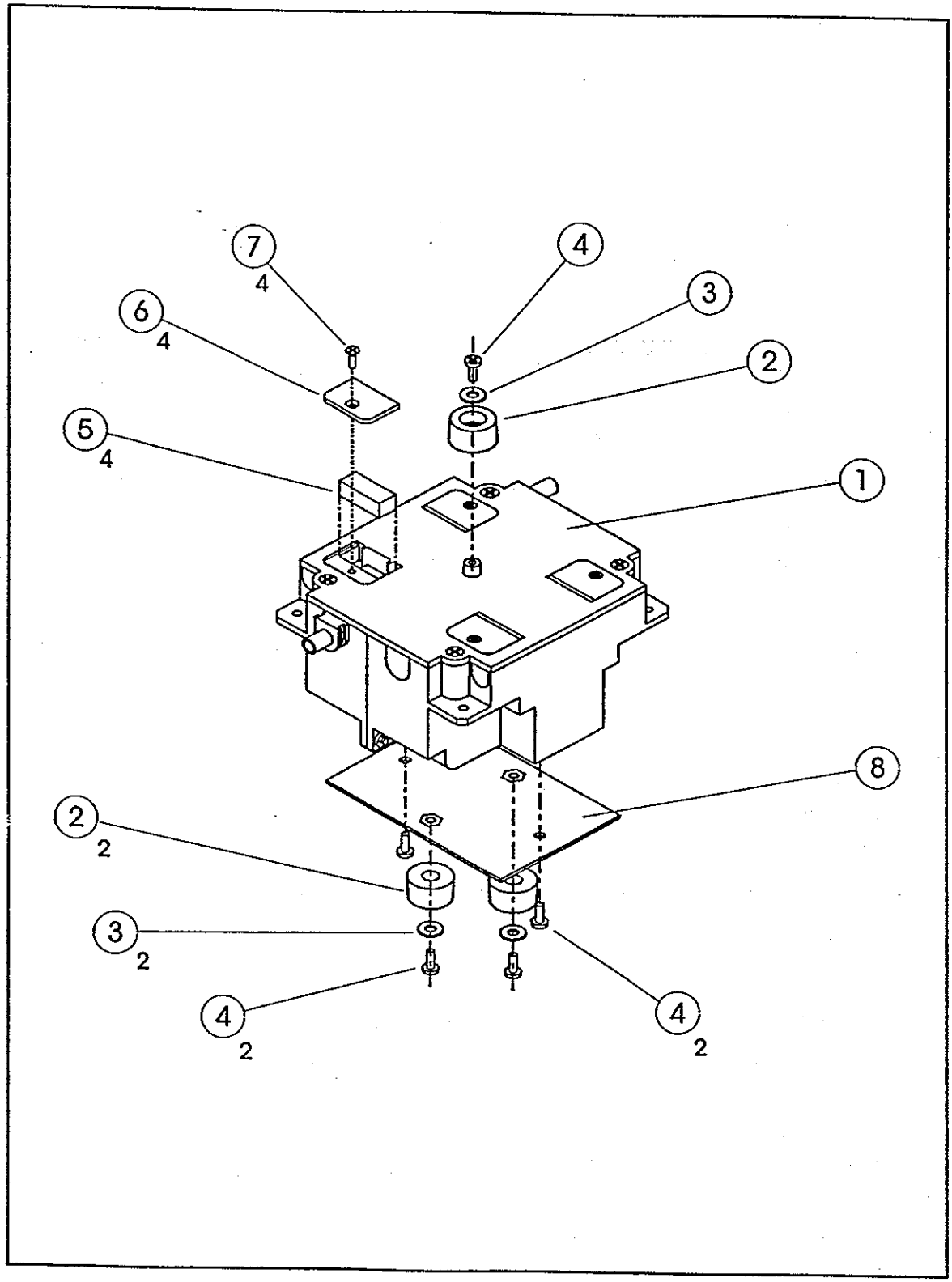


Fig. 6.5 Replacing Compressor Filters and Bump Stops

6.5 Replacing Compressor Filters and Bump Stops

Item	*Part Number*	*Description*	*Qty*
0	165072	Compressor assembly	Ref.
1	165003	Series IV Compressor (120V)	1
2	165310	Bump stops	3
3	FAS 160	Bump stop washers	3
4	FAS 184	M4 x 6 csk head Taptite screws	3
5	165313	Compressor filter	4
6	165314	Filter plate	4
7	FAS 193	Filter screw	4
8	198307	Bump stop plate	1

1. Remove pump rear case.
2. Remove compressor assembly (1) from pump case.
3. Inspect the upper and lower bump stops (2), if stops are worn or damaged, remove screws (4) washers (3) and replace both bump stops (2). Replace washers (3) and screws (4). Torque to 1.6Nm.
4. Four compressor filters are fitted. The filters (5) are located beneath the filter plates (6).
5. To replace filters (5), remove filter covers screws (7), remove filter covers (6) and withdraw filters (5). Replace with new filters and replace covers (6) and filter screws (5).
6. Replace compressor assembly in pump case.

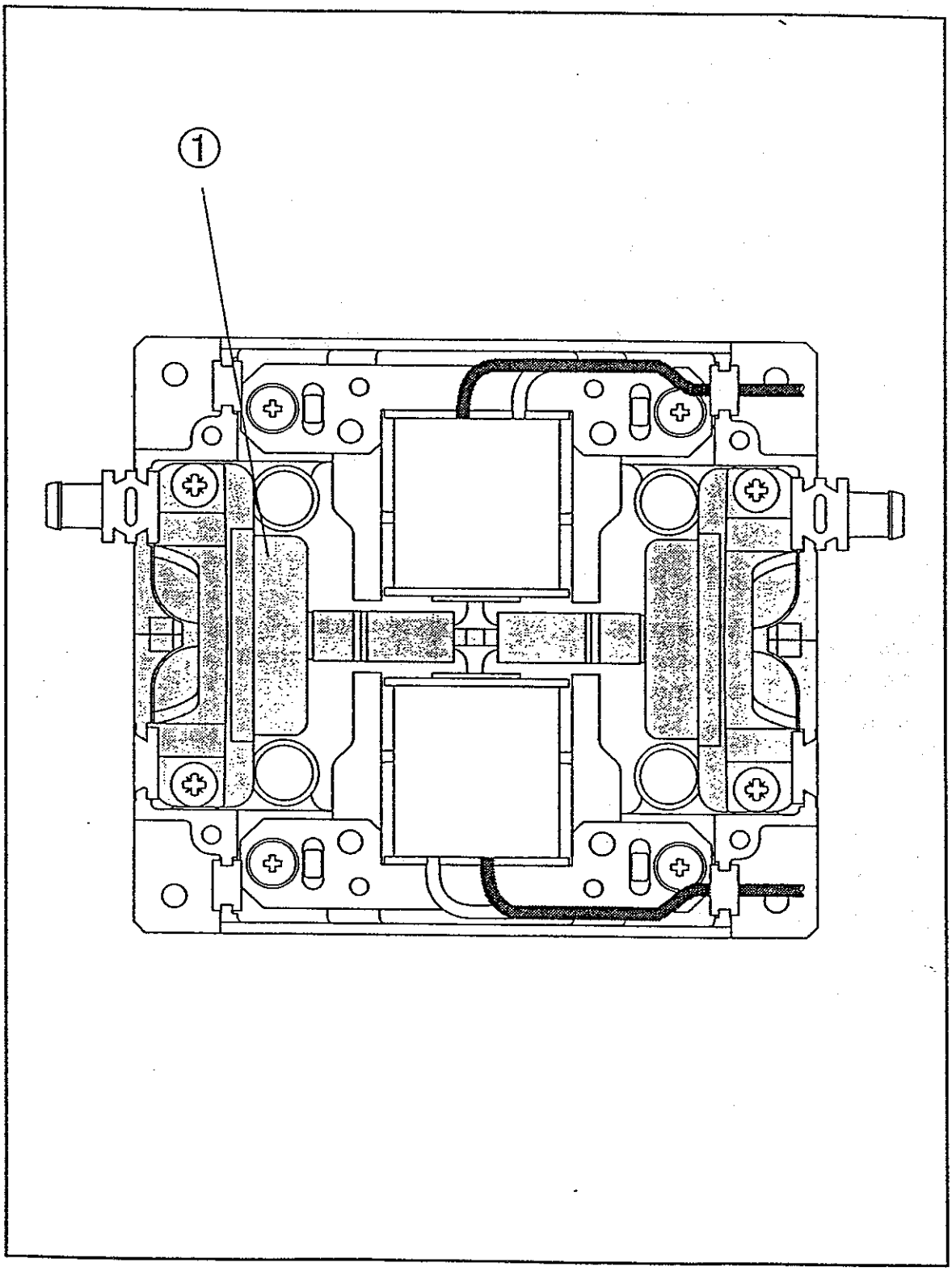


Fig. 6.6 Replacing the Shuttle/Valve Assembly

6.6 Replacing the Shuttle/Valve Assembly

Item	*Part Number*	*Description*	*Qty*
0	165003	Series IV compressor (120V)	Ref.
1	165054	Shuttle/Valve assembly	1
2	165306	Tube (omitted from Fig. 6.6)	4

Due to manufacturing and testing procedures, it is necessary to replace the above as a complete assembly.

1. Remove the compressor cover by unscrewing the four screws.
2. Remove four tubes (Part No. 165306) between the fittings at the top of the compressor and the connections at the base of the compressor.
3. Unscrew the four screws which secure the valve bodies to the base.
4. Carefully lift the complete assemblies and retain the screws.
5. Fit new shuttle/valve assemblies, fit and tighten retaining screws.
6. Replace the four tubes between the connections at the base of the compressor and the fittings at the top of the compressor.
7. Replace covers and secure with four screws.

6.6.1 Adjustment of Flow Rate

The flow rate of the compressor can be increased or decreased by adjusting the gap between the compressor coils and the shuttle valve magnet.

You will need Spacer Saddle Gauge Set, Part No.MIS155 comprising five saddle gauges. The gauges provide adjustment in steps of 0.5 liters/minute with gauge 'A' giving maximum air flow and gauge 'E' giving minimum air flow.

1. Identify which gauge has been used for the present coil setting, then select the appropriate gauge to increase or decrease flow as required.
2. Loosen the two securing screws on each coil and carefully place the appropriate saddle gauge over the shuttle valve magnet.
3. Adjust the coils to the gauge and hold them in position while tightening the fixing screws.
4. Remove the saddle gauge and re-check the compressor flow output.
5. Repeat the above procedure if necessary.

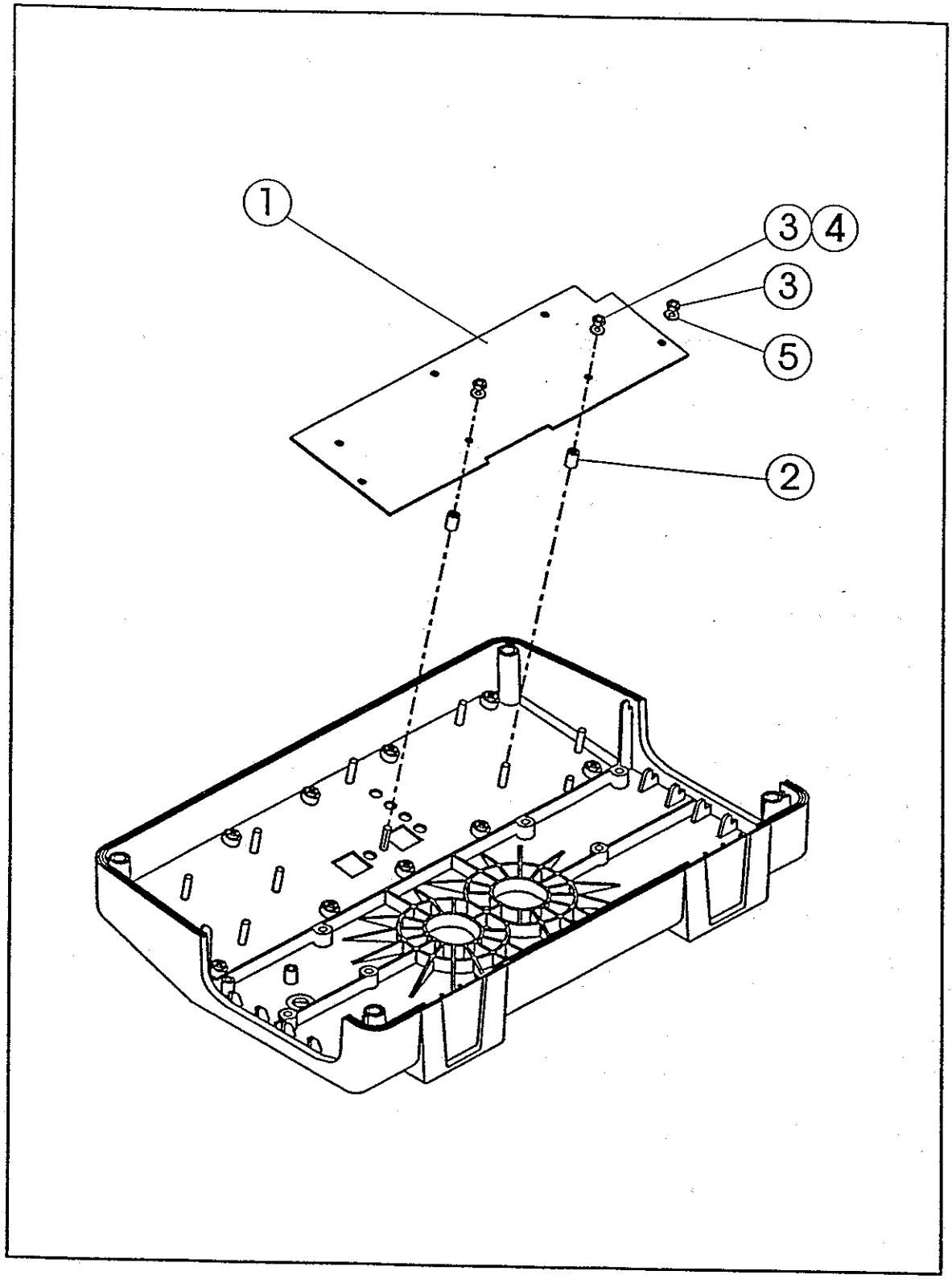


Fig. 6.7 Display Panel PCB Replacement

6.7 Display Panel PCB Replacement

Item	*Part Number*	*Description*	*Qty*
1	198064	Display panel PCB	1
2	151352	M3 Cl spacer 8mm long	7
3	FAS 098	M3 nut	7
4	FAS 091	M3 nylon washer	6
5		M3 shakeproof washer (int. teeth)	1
6	B32-1200	Keyswitch cap	1
7	55603304800-2	Battery assembly 4.8V	1
8	151-510	Fuse 100mA 20mm type T	1

CAUTION

Electrostatic discharge can seriously damage the display panel P.C.B. Prior to replacement or handling, adequate grounding precautions must be taken.

1. Remove the pump rear case (as described in 6.1).
2. Identify and disconnect all electrical connections to the board (1).
3. Remove the six M3 nuts (3) and nylon washers (4) securing the board to the case front. Remove one nut (3) and shakeproof washer (5) securing the ground wire assembly.
4. Withdraw the board from pump case and remove the seven spacers (2).
5. Replace the board in the reverse order of removal.

6.7.1 Replacing PCB Components

The only board mounted components that can be replaced are the battery assembly (7), fuse (8) and keyswitch cap (6). It is not necessary to remove the board from the pump case for this purpose. Replace the fuse only if it is clearly damaged.

6.7.1.1 *Replacing the battery*

For older style PCB (pre-issue 3), refer to Sub-section 6.11.

1. Disconnect the battery wires from the board connector CON12, cut and remove the cable tie and remove the battery assembly (7). Dispose of the battery safely in accordance with local authority regulations.
2. Thread a new cable tie into the self adhesive base. Install the new battery assembly in the same position as the one that was removed and close the cable tie to secure. Connect the battery wires to CON12.

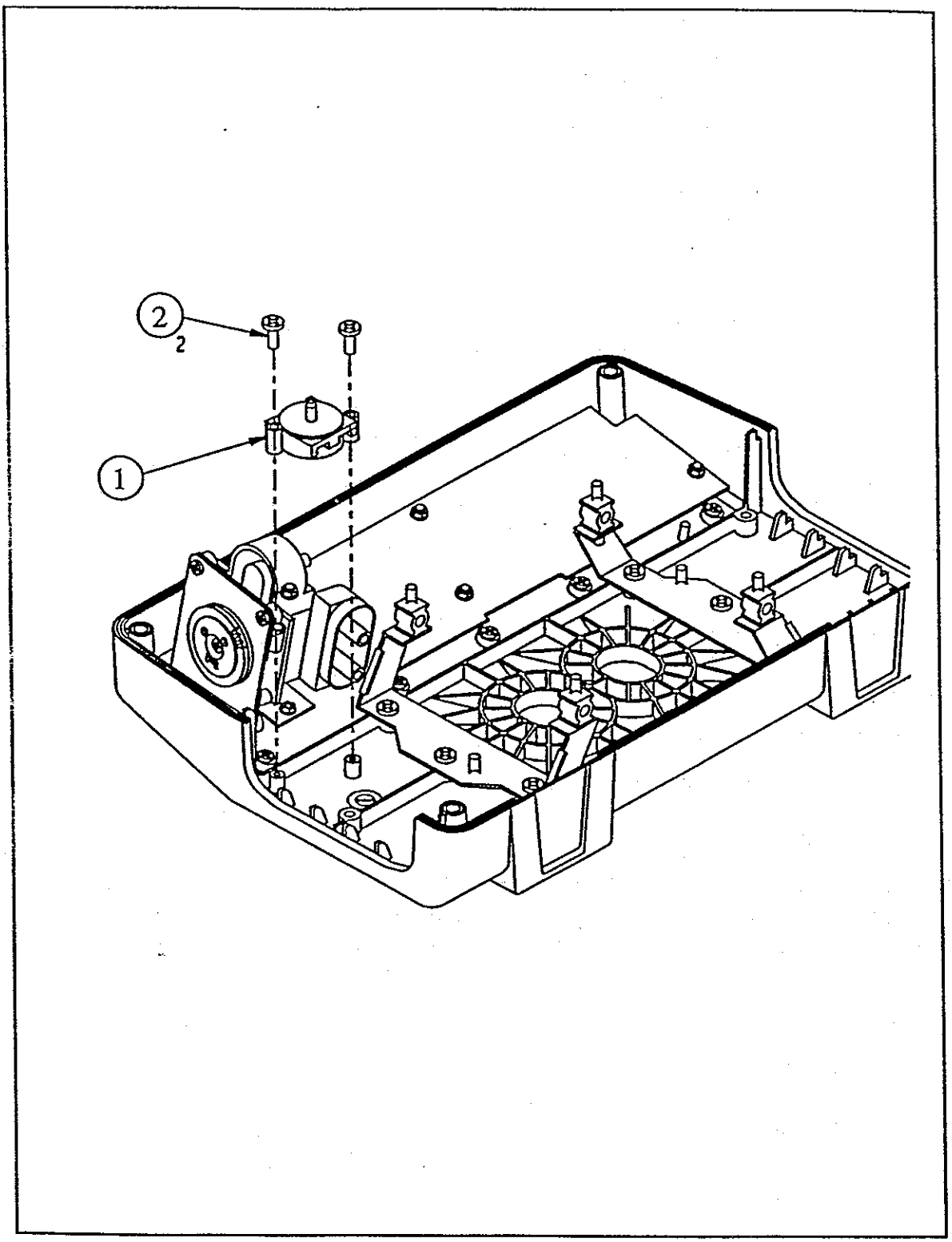


Fig. 6.8 Replacing the High Pressure Switch

6.8 Replacing the High Pressure Switch

Item	*Part Number*	*Description*	*Qty*
1.	151349	High pressure switch	1
2.	FAS 181	ø 3mm x 8mm self tappers	2

The high pressure switch is mounted directly to the pump case. If the unit develops a fault it must be replaceed.

1. Remove the pump rear case.
2. Identify and disconnect the electrical connections and hoses to the switch (1).
3. Remove screws (2) and remove unit from pump case.
4. If unit is faulty or damaged, replace by fitting in reverse order of removal.

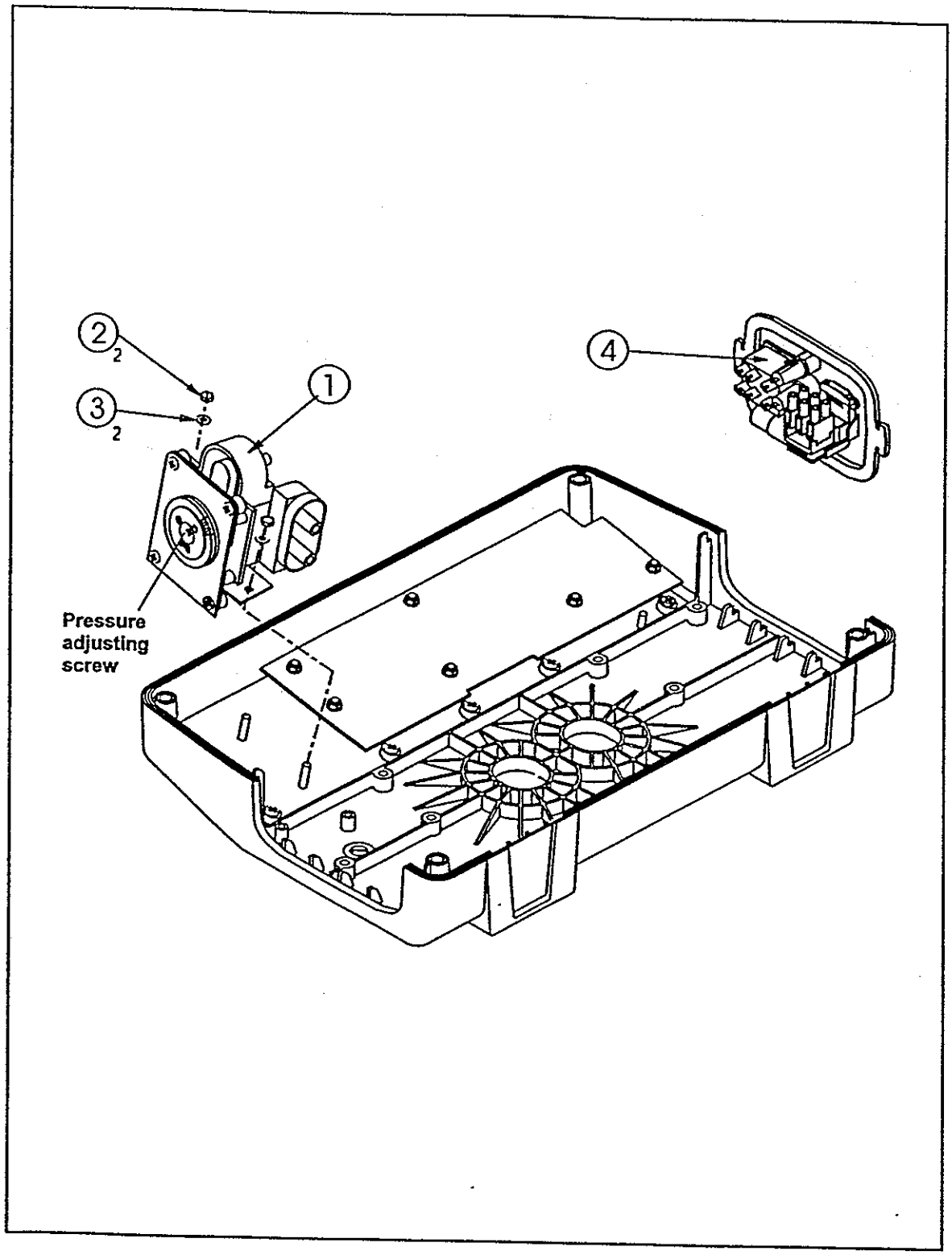


Fig. 6.9 Replacing the Pressure Control Sub-assembly and Power Switch

6.9 Replacing the Pressure Control Sub-assembly Replacing the Power Switch

Item	*Part Number*	*Description*	*Qty*
1	151060	Pressure control sub-assembly	1
2	FAS098	M3 Nut	2
3	FAS002	M3 Washer	2
4	151353	Power switch 250V	1

If it is necessary to adjust the pressure relief valve setting, this can be done without removing the pressure control sub-assembly from the case. Refer to Section 3, Testing.

6.9.1 Removing the Pressure Control Sub-assembly

The pressure control sub-assembly is attached to the pump front panel and can be withdrawn from the pump case by removing the pump rear case.

1. Remove the pump rear case (as described in 6.1).
2. Identify and remove all electrical connections and hoses to the pressure control sub-assembly (1).
3. Remove nuts (2) and washers (3) and remove pressure control sub-assembly from pump case.
4. If it is necessary to replace the assembly, replace it in the reverse order of removal.

6.9.2 Removing the Power Switch

The power switch must be removed through the electric power side panel assembly.

1. Remove the pump rear case (as described in 6.1).
2. Identify and remove all electrical connections to the power switch (4).
3. Depress the fixing lugs and push the power switch out through the electric power side panel assembly.
4. Replace all components in the reverse order of removal.

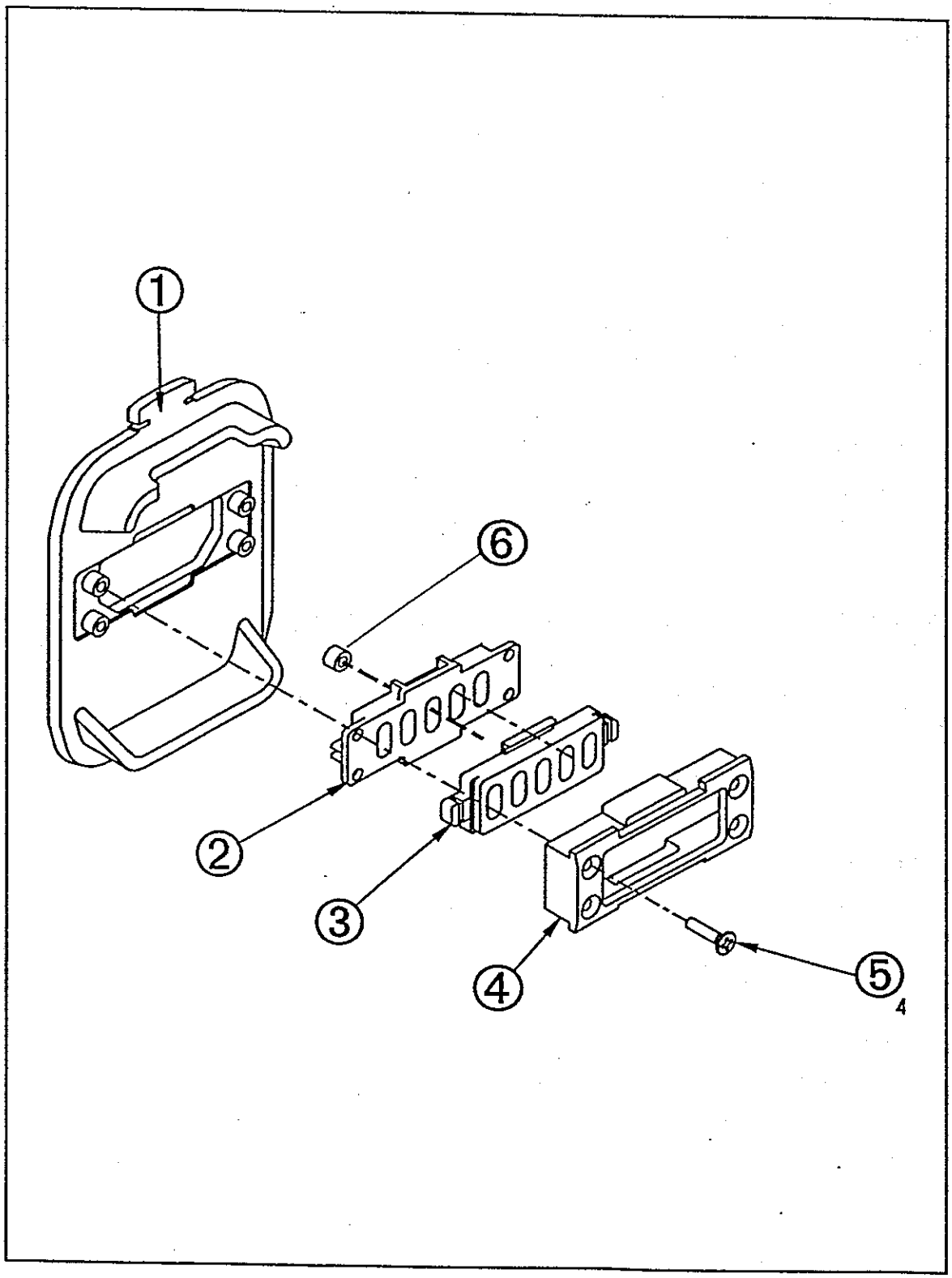


Fig. 6.10 Replacing the Connector Gasket

6.10 Replacing the Connector Gasket

Item	*Part Number*	*Description*	*Qty*
0	198056	Pneumatic side panel assembly	Ref
1	198302	Pneumatic side panel	1
2	151303	Manifold inner	1
3	151304	Manifold gasket	1
4	151301	Manifold outer	1
5	FAS180	Ø3 x 12mm csk screw (self tap)	4
6	CAS077	Plastic stop	1

Although the manifold gasket can be replaced with the case fully assembled, it is not possible to remove the manifold inner without opening the case and disconnecting the rotary valve 'T' tubes. Since these tubes are easily damaged, you are advised to replace the whole side panel assembly (including the rotary valve) if replacing the manifold inner. Refer to paragraph 6.3.

1. Remove the four manifold screws (5).
2. Remove the manifold outer (4), manifold gasket (3), leaving the manifold inner (2) in place.
3. Inspect gasket (3) for damage, replace if necessary.
4. Replace items in reverse order of removal. Sandwich the manifold gasket (3) between the inner and outer parts (2&4). Refit screws (5) and torque to 20cNm using bit size 1.

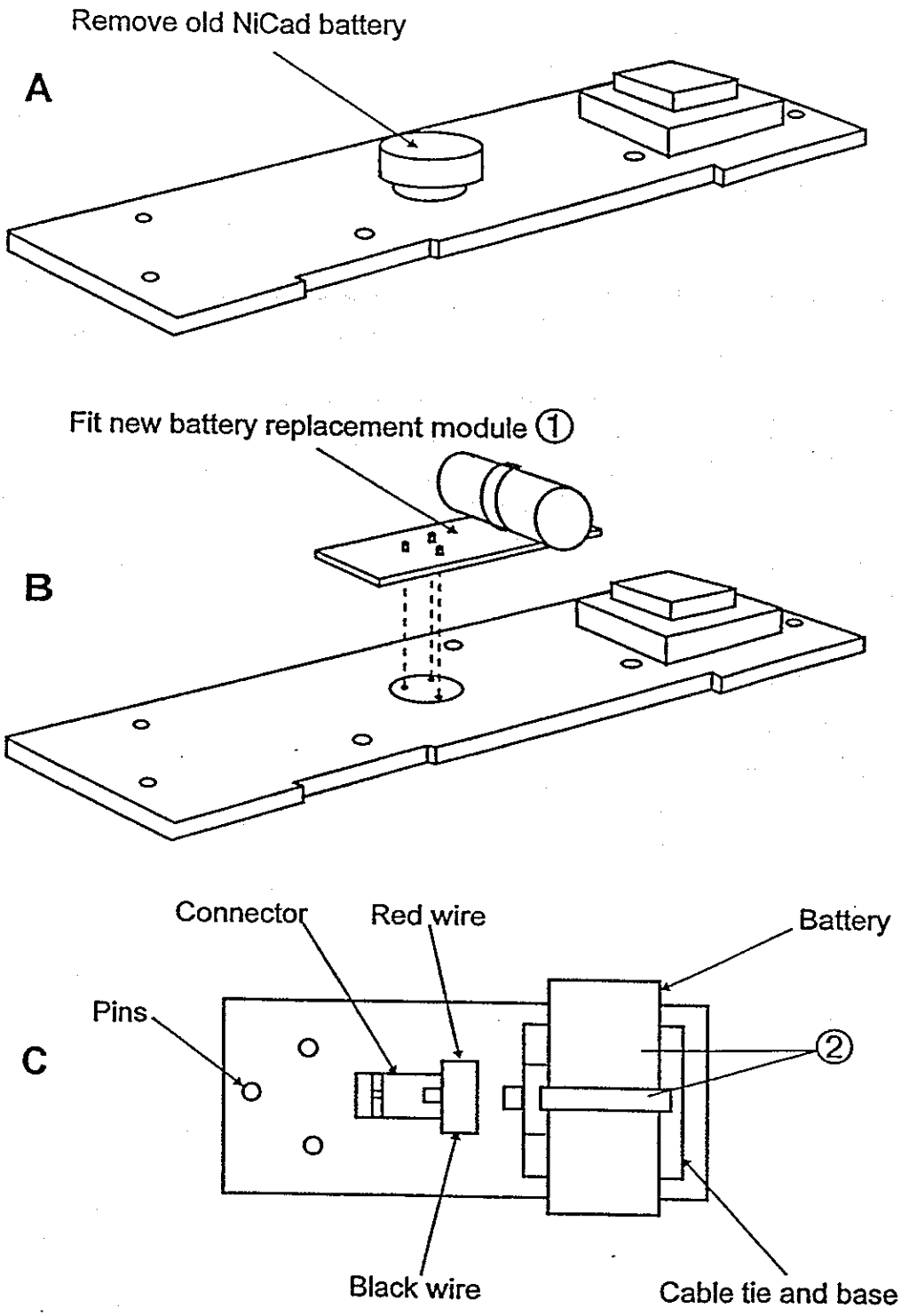


Figure 6-11 Battery Replacement Module

6.11 Battery replacement on Older Style PCB

Earlier versions of the printed circuit board are fitted with a NiCad battery that is no longer available as a service item. It is recommended that this Battery is replaced with a Nickel Metal Hydride (Ni mh) battery. For this purpose, a battery replacement module must be installed on the PCB.

Item	*Part No.*	*Description*	*Qty*
1	SP 198128	Battery replacement module	1
2	SP 198129	NiMH battery (with cable tie)	1

6.11.1 Installing Battery Replacement Module

1. Remove the PCB as described in Sub-section 6.7.
2. Refer to Fig. 6-11A. Unsolder and remove the old NiCad battery. Clean out the holes in the PCB using braid or a solder sucker.
3. Dispose of the old battery safely in accordance with local authority regulations.
4. Clean the area of the board around the solder holes, and for 3cm (1.5in.) towards the trandformer, using an alcohol based, ozone friendly cleaning agent.
5. Refer to Fig. 6-11B. Remove the protective film from the sticky pads on the underside of the battery module (1) and locate the three pins on the module in the solder holes on the PCB. Press down firmly to secure.
6. Turn the board over and solder the three battery module pins. Remove flux.
7. Inspect the PCB assembly for damage, dry joints or solser blobs and repair as necessary.
8. Replace the PCB assembly as instructed in Sub-section 6.7.

6.11.2 NiMH battery - replacement

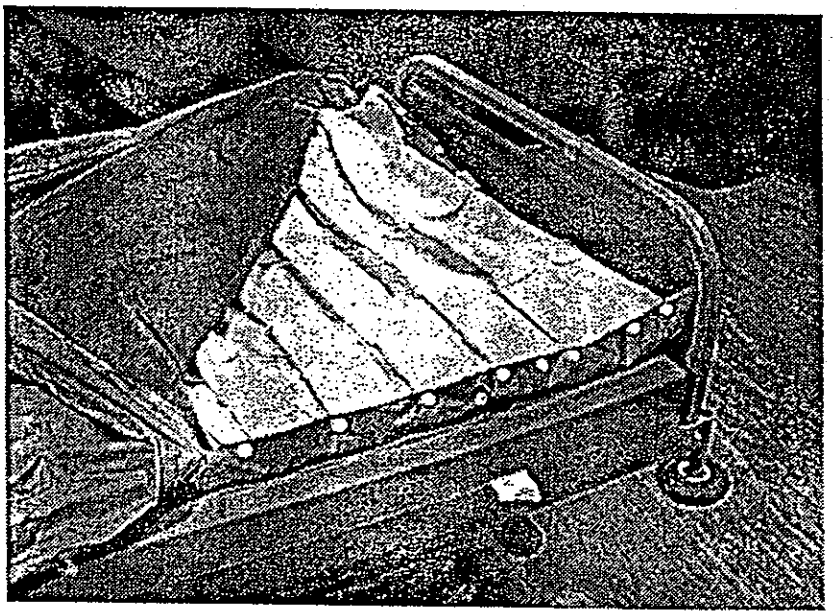
1. Remove the pump rear case as described in 6.1.
2. Refer to Fig. 6-11C. Cut and remove the cable tie securing the battery.
3. Remove and dispose of the battery safely in accordance with local authority regulations.
4. Thread the new cable tie into the self adhesive base in the same position as the one that was removed.

5. Connect the new battery pack (2) to the connector, ensuring correct polarity.
6. Install the battery and close the cable tie to secure.
7. Replace the pump rear case assembly and test the unit's Power Fail alarm.

Before carrying out any work on the mattress, ensure that the pump is switched off and that the 5-way tube connector is detached from the mattress.

7.1 Mattress Top Cover

1. Detach original top cover from base section (press studs situated on long sides, plus end flaps).



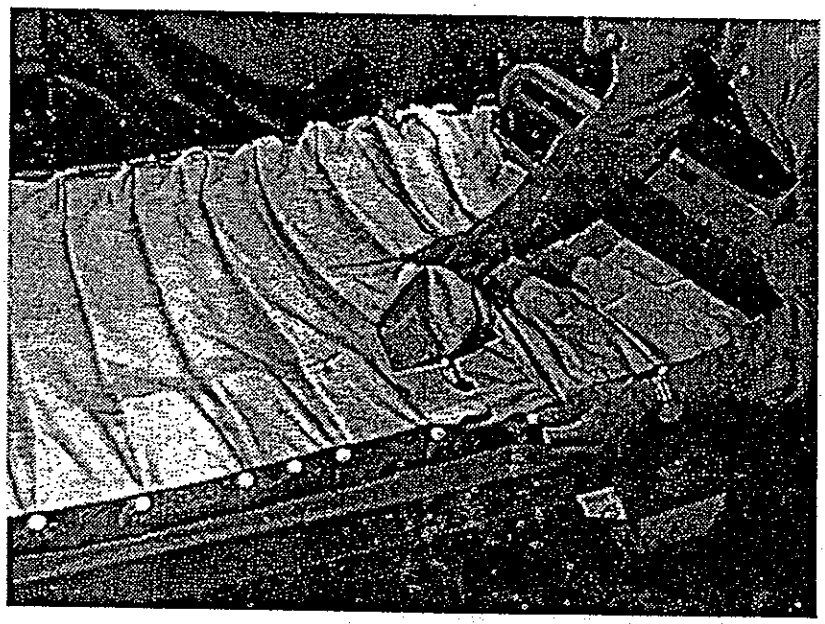
2. Replace with new cover.

7.2 Cell Assembly

Check that the replacement cell is the same type as that to be changed.

Free the damaged cell from the base sheet and manifold as follows:

1. Separate the two press-studs located on the cell flaps.

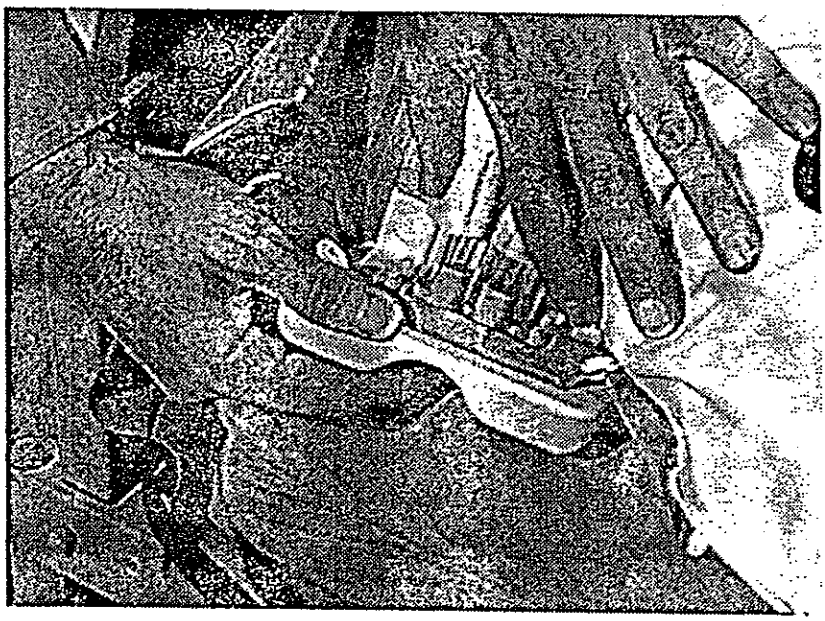


2. Disconnect the cell air connector(s) from the manifold.
3. Compare the damaged cell with its replacement to ensure that they are of similar types.
4. Install new cell by reconnecting manifold to cell air connector(s) and press-studs halves.

Note: *Manifold air connector fitting is simplified if the end of the connector is wetted with methylated spirit immediately prior to insertion.*

7.3 Manifold Assembly

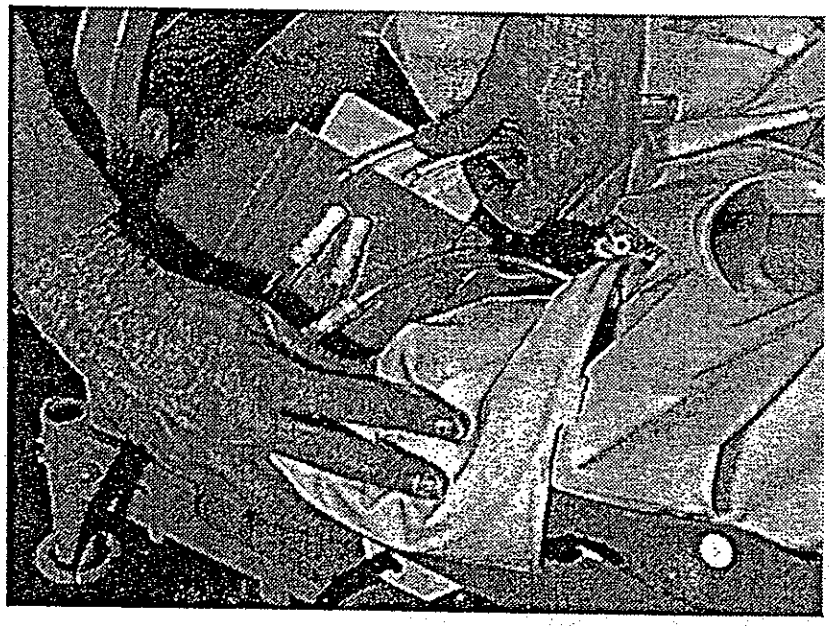
1. Disconnect all cell press-studs on the manifold side of the mattress plus all cell connectors.
2. Disconnect manifold from five-way tube connector plate.



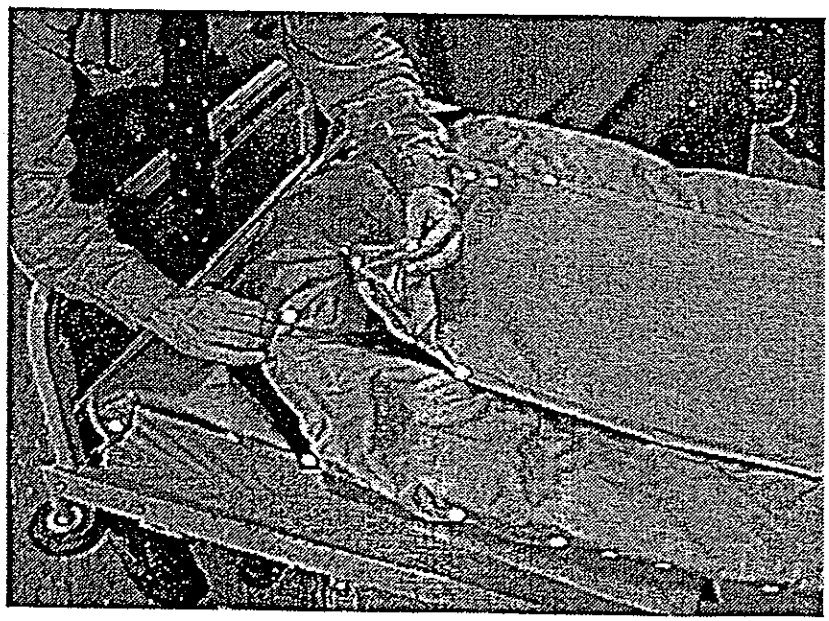
3. When fitting the new manifold assembly reverse steps 1 and 2.

7.4 Sensor Pad Assembly

1. Unfasten and remove top cover.

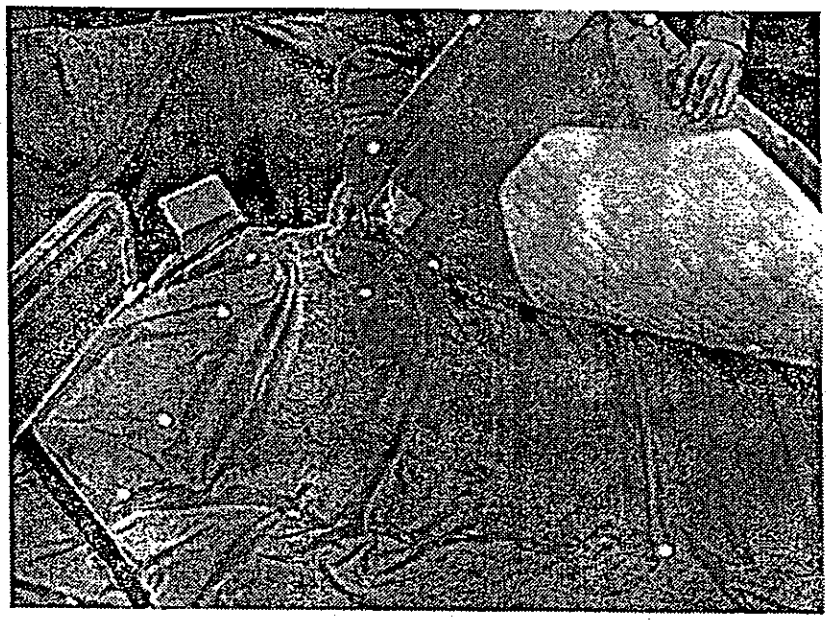


2. Disconnect sensor pad from the air feed tube connections (located below manifold at first cell).
3. Turn mattress over (cells face down).

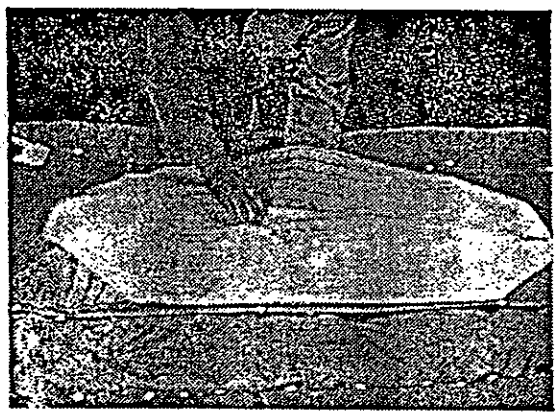


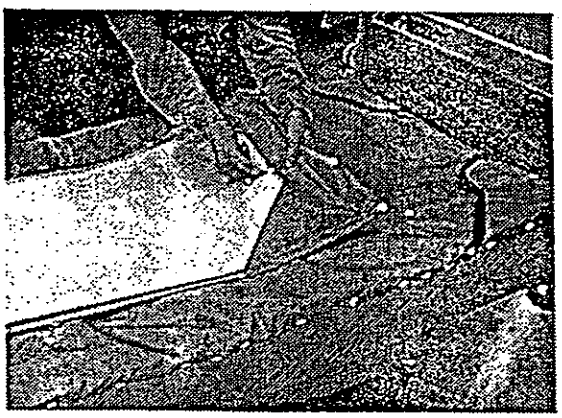
4. Disconnect all 14 press studs on sensor pad holding pocket.

5. Pull tube through holes in mattress base sheet.



6. Disconnect three center studs or elasticized strap (depending on model) on sensor pad and remove from holding pocket.





When fitting new sensor pad, reverse steps 1 to 6 ensuring sensor pad does not kink in the corner diagonal pocket.

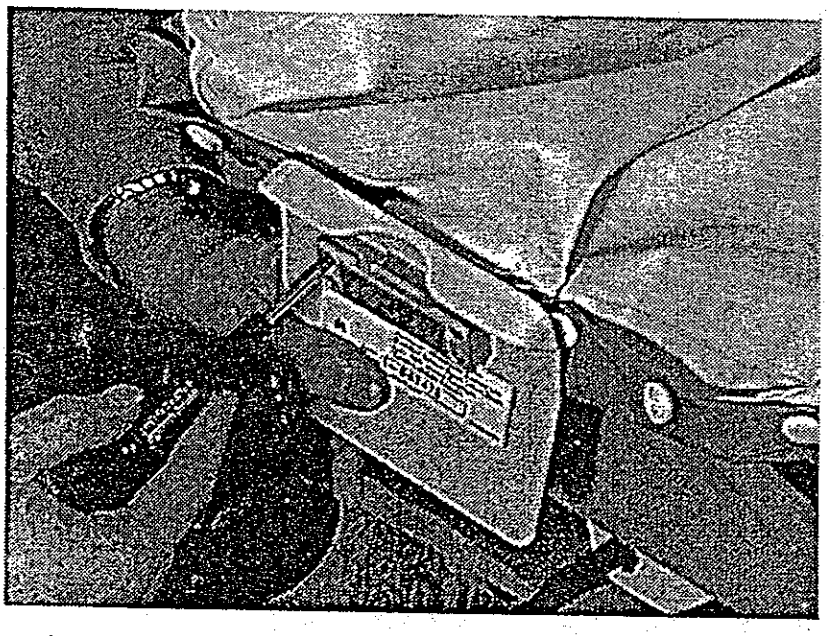
Replace with a new sensor pad in the reverse order to the above.

Note: Take great care that the sensor pad lays completely flat and that air feed tubes are not kinked or twisted.

Failure to observe these points could cause the mattress to malfunction and operate at abnormally high pressures.

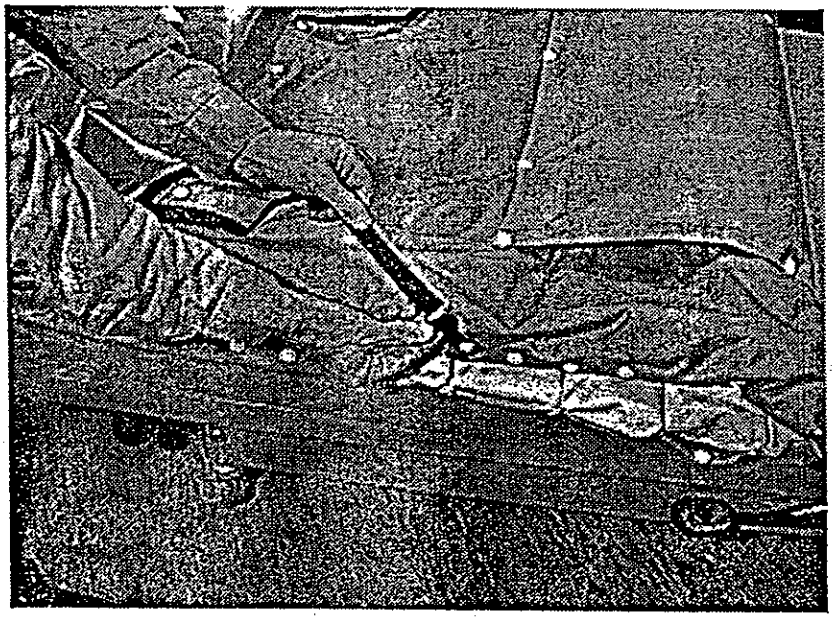
7.5 Five-Way Manifold Gasket

1. Remove the four cross-head screws located in the corners of the five-way socket molding and the four domed nuts located on the inside of the plate.



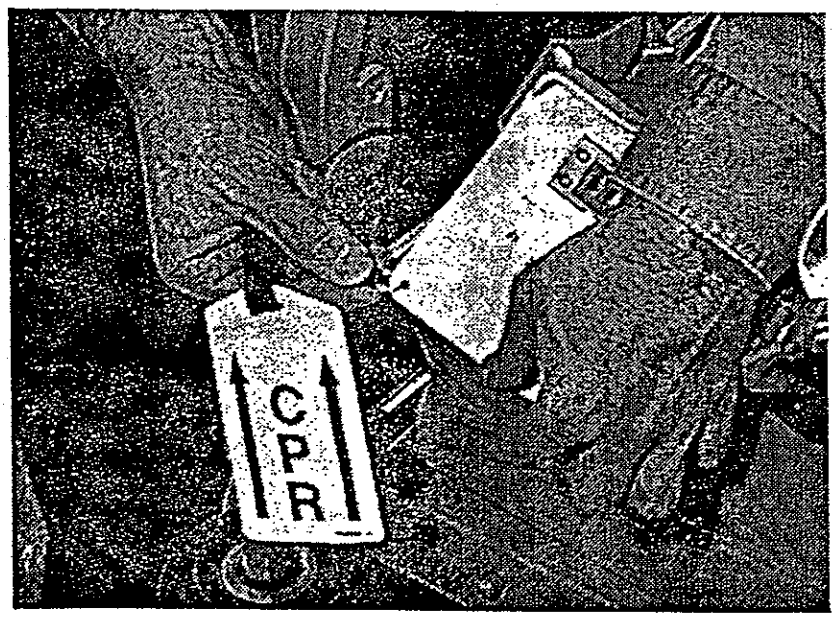
2. Remove the gasket retaining molding complete with gasket.
3. Assemble a new gasket into the retainer molding.
4. Reassemble and fully tighten corner screws.

7.6 Tie Strap Assembly



These items simply thread through the buckle assembly which is permanently attached to the mattress base cover. Replace lost, damaged or worn tie straps as necessary.

7.7 Swing Label Assembly



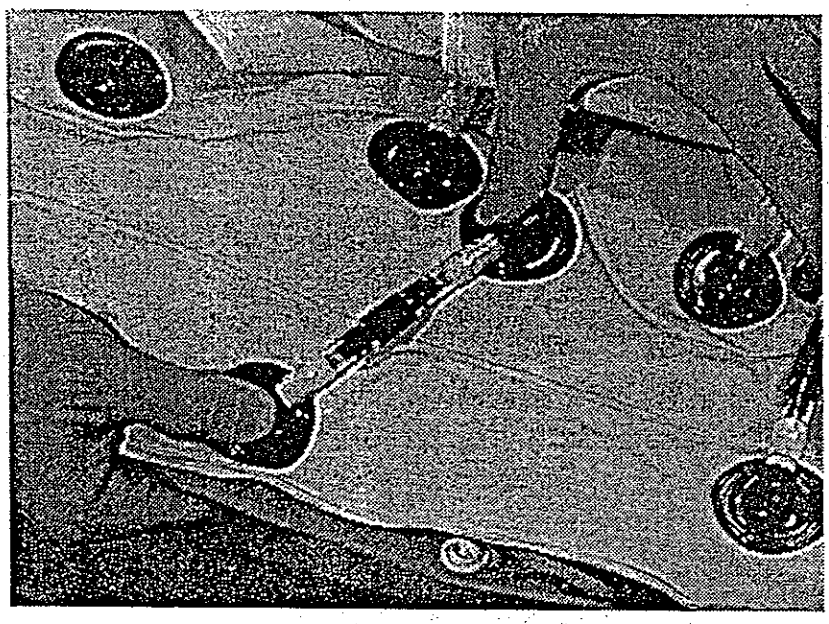
If this assembly becomes damaged or lost, replace at the key ring end.

7.8 Partial Non-Return Valve Assembly (Mattress Air Manifold)

It is recommended that both manifold partial non-return valves are replaced as any detrimental effects (e.g., dust build up) will affect both valves.

Change procedure is as follows:

1. Disconnect partial non-return valve/tube assembly from the side entry grommet straight connectors at both ends.



2. Ensure that the arrow mark on the replacement partial non-return valves are pointing towards the head end of the mattress. Mattress malfunction will occur if these valves are fitted facing the foot of the mattress.
3. Fit the replacement assemblies to the side entry grommet, using methylated spirit as a lubricator if necessary.

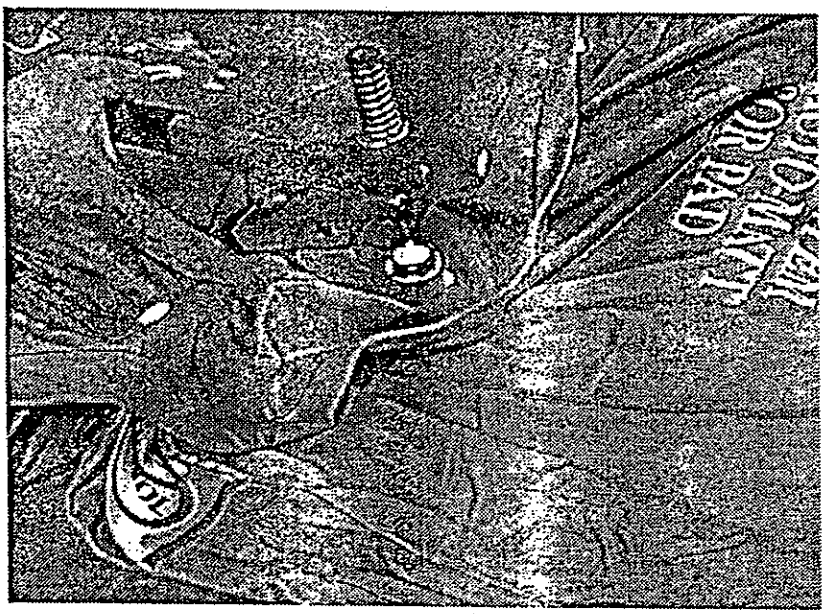
7.9 Press Stud Replacement

Press studs can be replaced using handpress tool part number MIS 143

The press stud numbers are: Supasnap post – FAS 169
Supasnap stud – FAS 170
Supasnap socket – FAS 171

Replacement is carried out as follows:

1. Remove the old press stud parts, if necessary, using side-cutters. Be careful not to damage the mattress fabric.
2. Place the new Supasnap post (FAS169) in the location hole in the assembly where it is to be fitted. (Check with other studs for correct position.)



3. Position the post and assembly in the hand press tool.
4. Depending on which is to be fitted, fit a Supasnap stud (FAS170) or Supasnap socket (FAS171) on to the post and firmly squeeze the hand press tool handles together.
5. Remove the secured stud/assembly from the hand press tool.

Pump

Size:	Length	336mm (13.2")
	Height	210mm (8.3")
	Depth	100mm (4")
Weight:		3.5kg (7.7lb)
Case material:		ABS/polycarbonate alloy
Supply Voltage:		120Vac, 60Hz
Electrical rating:		15W
Fuse rating:		F500mA
Air inlet filter:		Service replaceable
Operating cycle:		10 mins.

Electrical Safety Standards

IEC601-1
BS5724, Part 1
VDE 0750 : Teil 1
UL544

Degree of protection against electric shock:	Class I, type BF
Degree of protection of ingress of liquids:	Ordinary (not protected)
Mode of operation:	Continuous

Symbols

~	alternating current
O (Off)	Power disconnection from the electric supply.
I (On)	Power connection to the electric supply.
	Type BF

Tube Set

Length:		1 meter (39.4")
Material		
Tube:		5-way molded PVC
Connectors:		Molded nylon

Overlay

Size:	Length	1980 mm (78")
	Height	135 mm (5.3") at edges 100 mm (4") at center
	Width	875 mm (34.5")
Weight:		5kg (11 lb)
Cover material:		Polyurethane-coated knitted nylon
Base material:		Polyurethane-coated woven nylon
Cell material:		0.3mm (0.012") Polyurethane flexible sheeting

It is recommended that the following spare parts be carried in stock and re-ordered as used :

Item		Qty
Pump spares		
Compressor filters	165313	4
Pump unit filters	151312	1
Compressor shuttle/ valve assembly	165091	2
Anti-vibration mounts	198375	4
Manifold gasket	151304	2
Pump fuses 500mA	151368	2
Battery assembly	55603304800-2	1
Battery replacement set	SP 198128	1
Mattress spares		
Cells	152140	3
Manifold gasket	151304	1
Partial non-return valves	152146	2
Tubeset assembly	197067	1

Spare parts can be ordered from :

Huntleigh Healthcare Inc.
227 Route 33 East
Manalapan
NJ 07726

Telephone: 1-800-223-1218 Ext. 4
Fax: 908-446-1938

Huntleigh Healthcare Inc. is a subsidiary of Huntleigh Technology Inc., distributor of the equipment.

Pump

Part Number	Product Description	Qty Per Pump
SP-198053-USA	Rear Case Assembly	1
151311	Filter Housing	2
151312	Filter	1
SP-198300-ASSY	Case Front	1
151098	Silencer Bag	1
151303	Manifold Inner	1
151304	Manifold Gasket	1
151316	Manifold Outer	1
SP-198057-USA	Front Panel Assembly	1
BP300	Power Lead	1
SP-198311-USA	Grommet	1
151051	Hanging Bracket	1
165072	Single Compressor Assembly (120V)	1
165310	Bump Stops	2
198307	Bump Stop Strap	1
SP-198064-120V	Autoexcel Control PCB (leaded)	1
198066	Sounder Assembly	1
198067	High Pressure Switch Assembly	1
SP-198086-ASSY	Pressure Control Assembly	1
198085	Rotary Valve Sub-assembly	1
165054	Shuttle-valve Bodies Assembly	1
165313	Compressor Unit Filters	4
165314	Filter Fixing Plates	4
151321	Rubber Feet	8
CAS011	Pump Fuses 500mA	2
SP-198059-DFS	Power Side Panel Assembly	1
198070	Fuse Holder Assembly (live)	1
198071	Fuse Holder Assembly (neutral)	1
198077	Power Filter Assembly	1
SP-198056-ASSY	Pneumatic Side Panel Assembly	1

Mattress

Part Number	Product Description	Qty Per Pump
197053	Manifold Assembly Welded Static	1
197054	Base Loop Sheet Assembly. Welded	1
197060	Top Cover Assembly.	1
197061	Cell Assembly Standard (ventilated)	15
197062	Cell Assembly Static (non-ventilated)	3
197070	Manifold Assembly (standard)	1
197099	Swing Label and Web Assembly	1
197101	Base And Sensor Pad Assembly	1
197102	Sensor Attachment Assembly	1
197106	Sensor Pad Assembly	1
197112	Foam Semi-rigid Assembly	1
197307	Soft Foam Assembly	1
197110	5-way Connector and Tube Assembly	1
197300	Back Plate	1
197312	Nut M3 Dome Plastic	4
197067	Tube set Assembly	1
151304	5 Way Manifold Gasket	1
151316	5 Way Manifold Outer	1
197302	Handle Plate	1
FAS196	Screw M3 X 25mm csk. pozi.	4
197319	Kitbag Printed Autoexcel	1
CAS077	Flowtron Stopper	1